VOL. XXII. Nº 7. JULY 1937

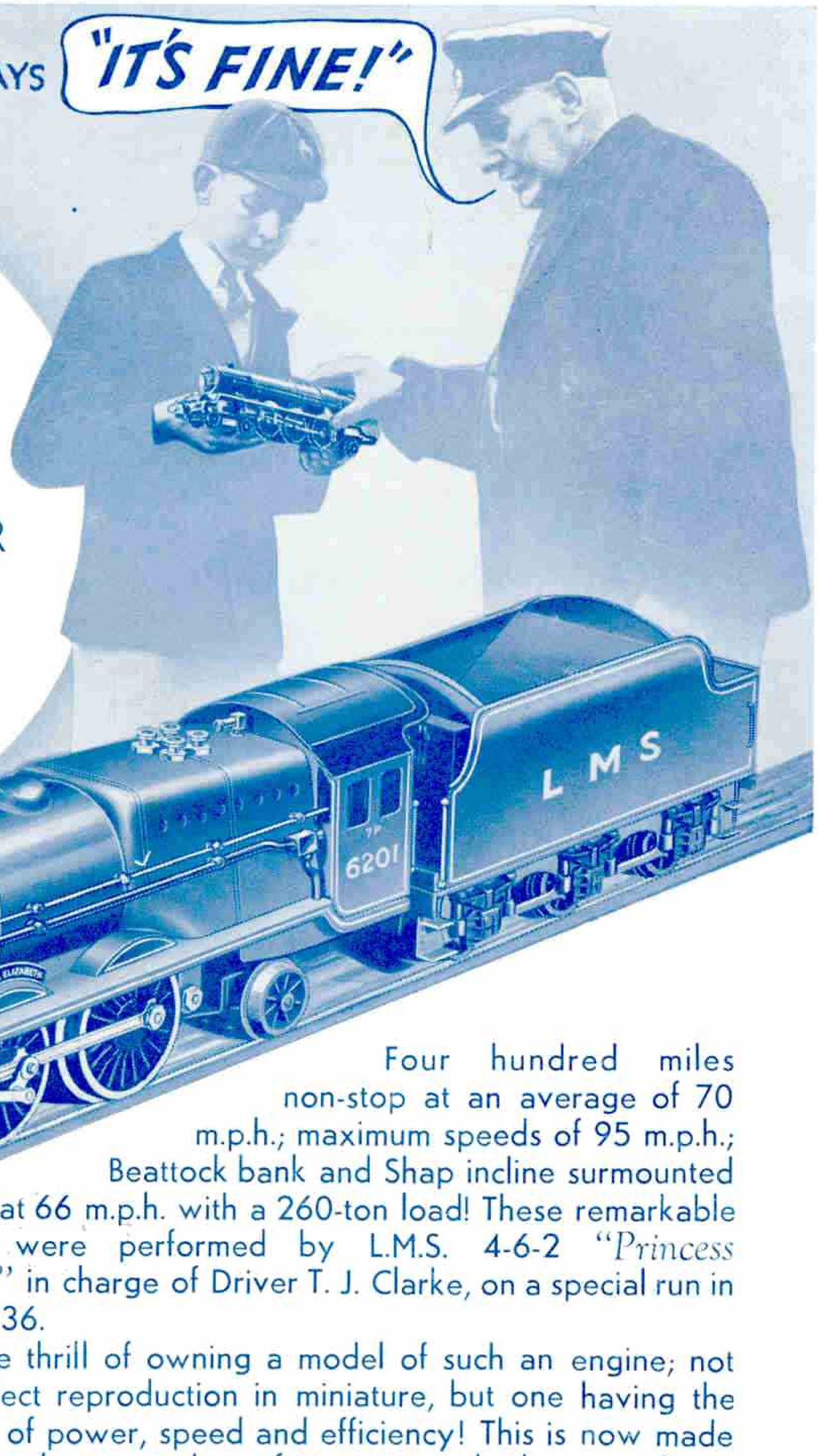
MECCANO MAGAZINE



300-TON HOISTING BLOCK FOR FLOATING CRANE

6D.

DRIVER CLARKE SAYS "IT'S FINE!"



The new

HORNBY

SCALE MODEL OF
L·M·S RECORD-BREAKER

"Princess Elizabeth"

Four hundred miles non-stop at an average of 70 m.p.h.; maximum speeds of 95 m.p.h.; Beattock bank and Shap incline surmounted at 66 m.p.h. with a 260-ton load! These remarkable feats were performed by L.M.S. 4-6-2 *"Princess Elizabeth,"* in charge of Driver T. J. Clarke, on a special run in November 1936.

Think of the thrill of owning a model of such an engine; not merely a perfect reproduction in miniature, but one having the same qualities of power, speed and efficiency! This is now made possible by the latest product of Meccano Ltd.—the magnificent Hornby scale model locomotive *"Princess Elizabeth."* Look at the photograph above! What a splendid appearance the model has with its massive six-coupled driving wheels, fascinating valve gear, and Royal nameplate! It is driven by a 20-volt electric motor, fitted with the world-famous Hornby Remote Control.

Price, complete with tender, in special presentation box, £5 5s 0d.

The model may be purchased also through the new Hornby Deferred Payments Scheme. Ask your dealer for details (Not available outside Great Britain and Northern Ireland.)

HORNBY TRAINS

MECCANO LIMITED, BINNS ROAD, LIVERPOOL 13

STOP PRESS NEWS!

THREE BOATS IN ONE

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Telephone: REGENT 3161

ARE YOU AN AUTO-MAGICIAN?

No. 22 *July, 1937*

Hands up!

Hold your friends up at the point of the AUTO-MAGIC FILM GUN and see their surprise when you show them that it really "shoots" films! Point it at any flat surface, pull the trigger and watch the amazingly clear picture which it projects. Carry a film show in your pocket!



(Foreign.)

PRICE COMPLETE WITH BATTERY AND ONE FILM

Set of three films 1/6. Batteries 4d. each. **6/11** Post 6d.

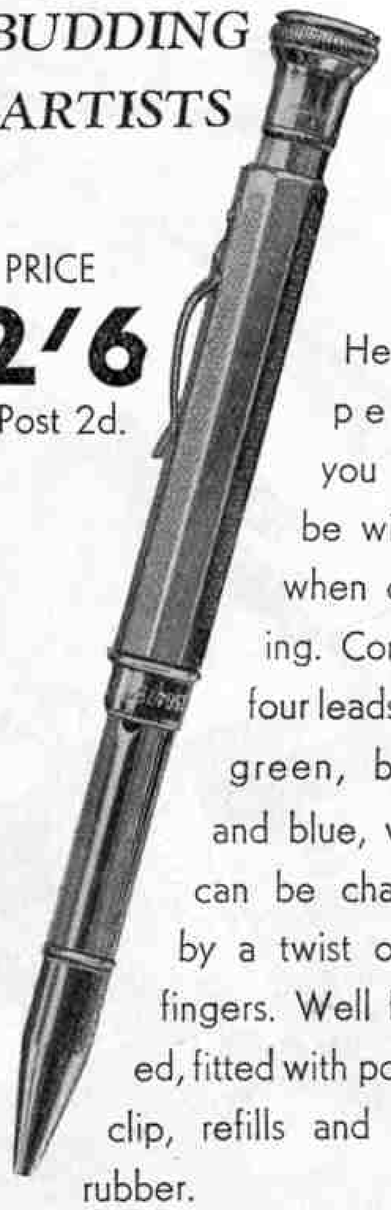
THE MYSTERY SHIP!

Here's your chance to have a real working model of a "Q" boat for your own. Experiment with its detachable superstructures and change it from liner to gun-boat, from gun-boat to cargo boat. Disguised in a flash! Fitted with strong clockwork motor which allows an amazing radius of action and a fine turn of speed. (Foreign.)

PRICE ONLY **4/6** Post 6d.

FOR BUDDING ARTISTS

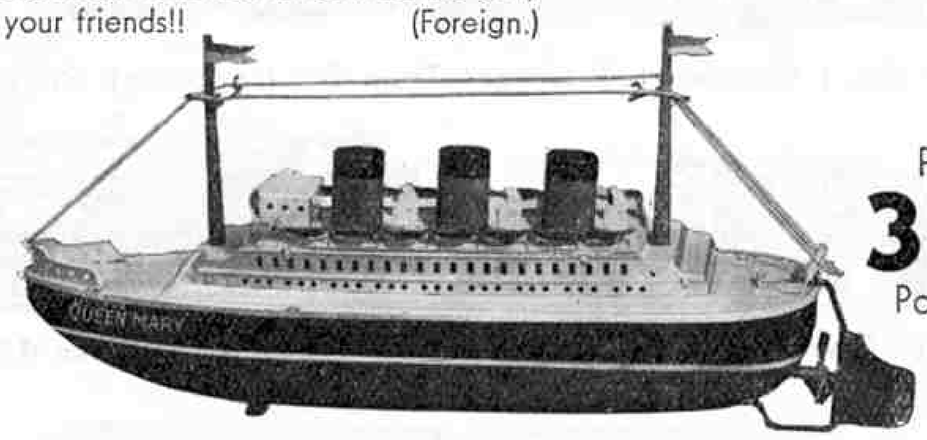
PRICE **2/6** Post 2d.



Here's a pencil you can't be without when drawing. Contains four leads, red, green, black and blue, which can be changed by a twist of the fingers. Well finished, fitted with pocket-clip, refills and india rubber.

With this fine working model of the "Queen Mary". Every detail exact. Beautifully finished with red hull and white superstructure and sparking funnel. Fitted with strong clockwork motor. You'll be the envy of your friends!! (Foreign.)

GAIN THE BLUE RIBAND *of the* ATLANTIC



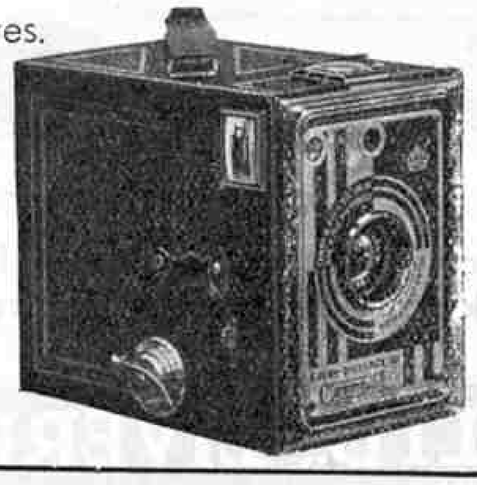
PRICE **3/11** Post 4d.

A CAMERA FOR YOUR HOLIDAYS!

Keep a record of your doings this summer with the aid of this amazing Coronet Box Camera. Takes 8 2¼" x 3¼" or 16 2¼" x 1⅝" pictures. Easy to handle with its colour filter. Takes wonderfully clear snaps.

Standard films 1/- extra.

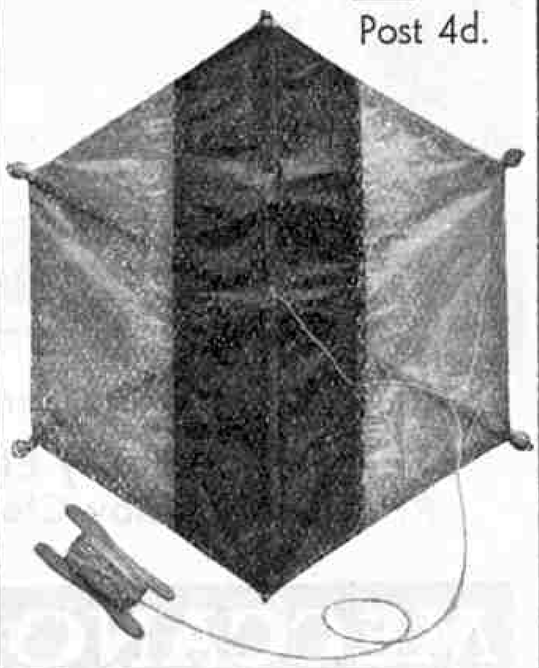
PRICE **10/6** Post 6d.

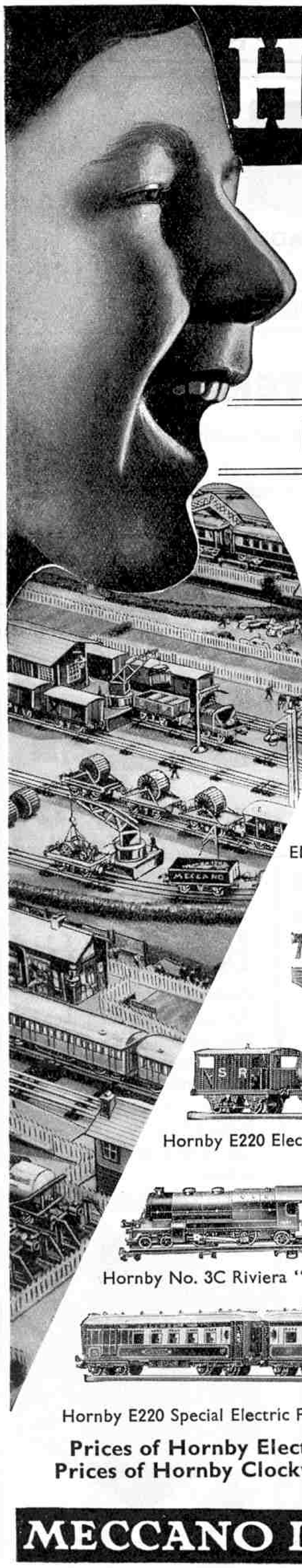


Complete Kite outfit

Assemble your own kite with the aid of this magnificent kite outfit. Durable, waterproof material, gaily coloured body and tail. Easy to fly. And now's the weather for flying kites!
Complete with cord and winder.

PRICE **2/-** Post 4d.





HORNBY TRAINS

BRITISH AND GUARANTEED

PRODUCT of MECCANO LIMITED LIVERPOOL

Real and Lasting Fun

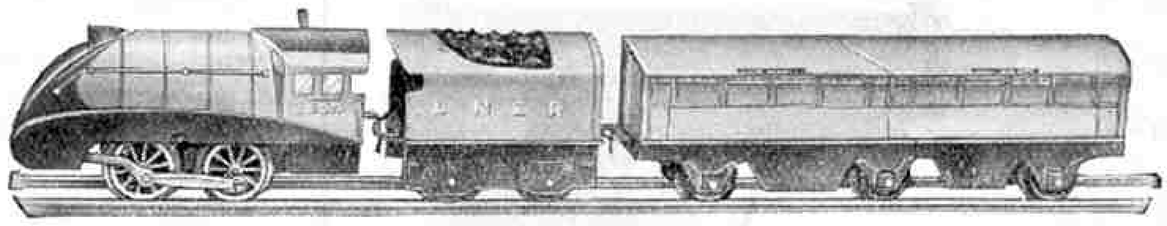
The splendid fun of running a Hornby Railway is real and lasting, because of the exceptional strength and reliability of Hornby Locomotives, both Electric and Clockwork, the realistic appearance and easy running of the Rolling Stock, and the wide range of effective Accessories.

From the day of their introduction Hornby Trains have always represented the latest model railway practice. Designs are continually being improved and new items added so that the system is complete in practically every detail.

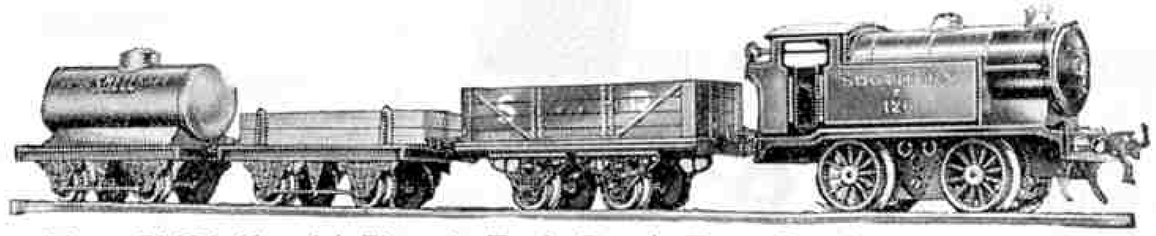
Ask your dealer for a copy of the latest Hornby Train price list.

Boys! Run your own model railway

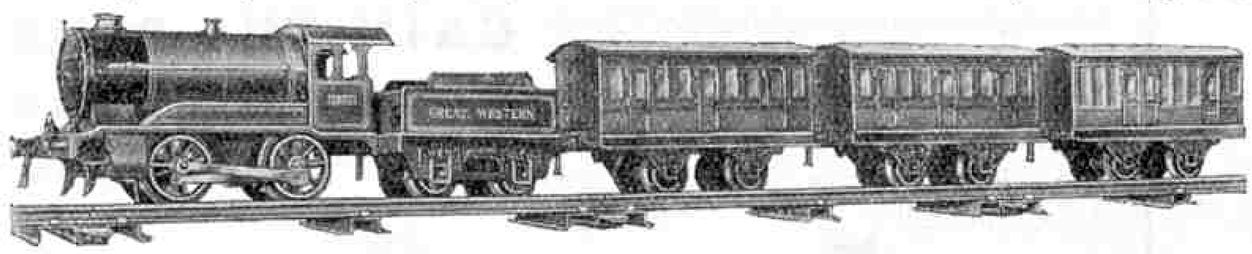
A SELECTION FROM THE RANGE OF HORNBY ELECTRIC and CLOCKWORK TRAINS



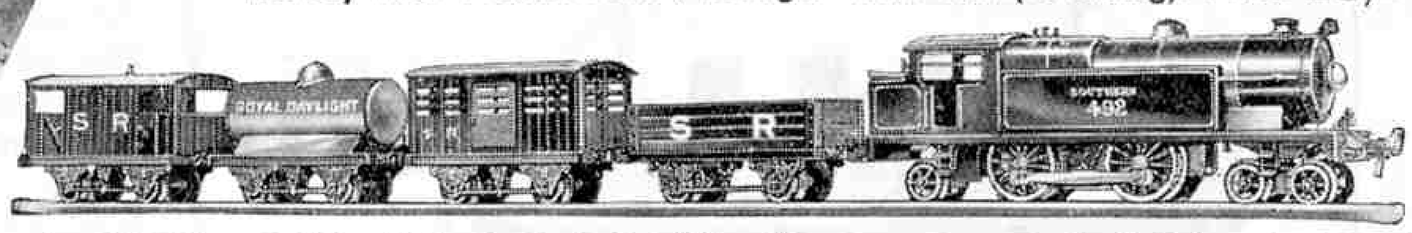
No. O "Silver Jubilee" Clockwork Passenger Train Set, L.N.E.R. (non-reversing). Price **7/6**



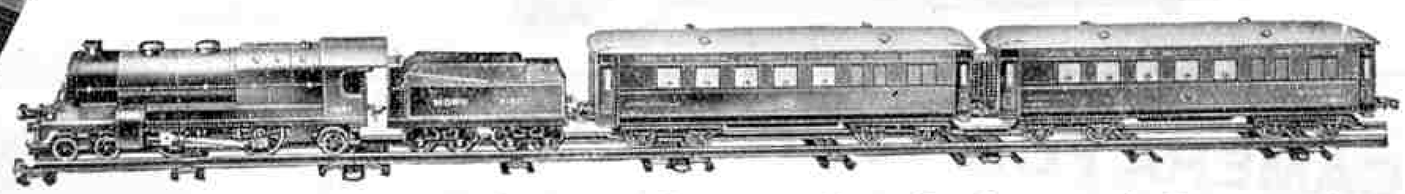
EM320 (20-volt) or EM36 (6-volt) Electric Tank Goods Train Set (reversing). Price **24/-**



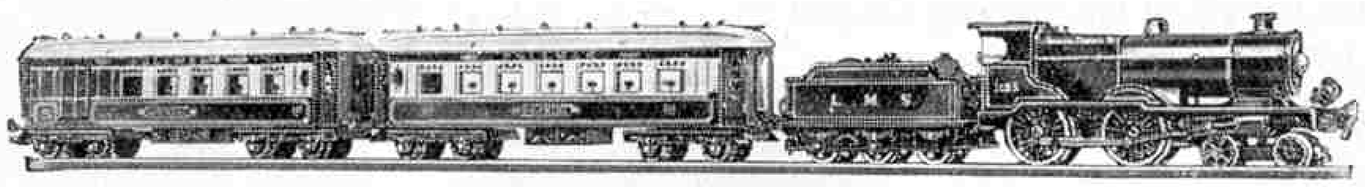
Hornby No. 1 Clockwork Passenger Train Set (reversing). Price **25/-**



Hornby E220 Electric Mixed Goods Train Set (20-volt, automatic reversing). Price **47/6**

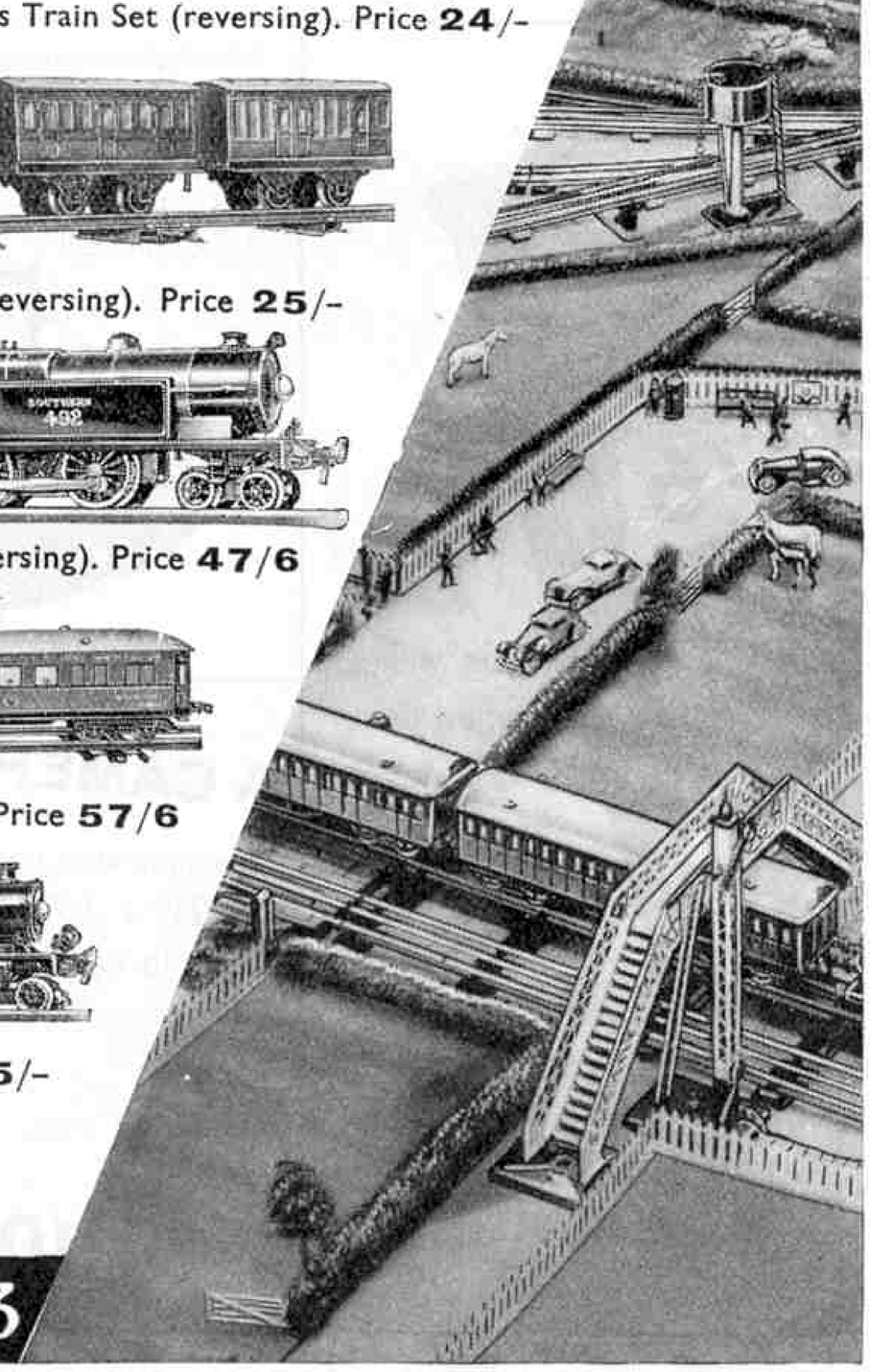


Hornby No. 3C Riviera "Blue" Clockwork Passenger Train Set (reversing). Price **57/6**



Hornby E220 Special Electric Pullman Set (20-Volt, automatic reversing). Price **75/-**

Prices of Hornby Electric Trains Sets from 15/- to 75/-
Prices of Hornby Clockwork Trains Sets from 4/11 to 65/-

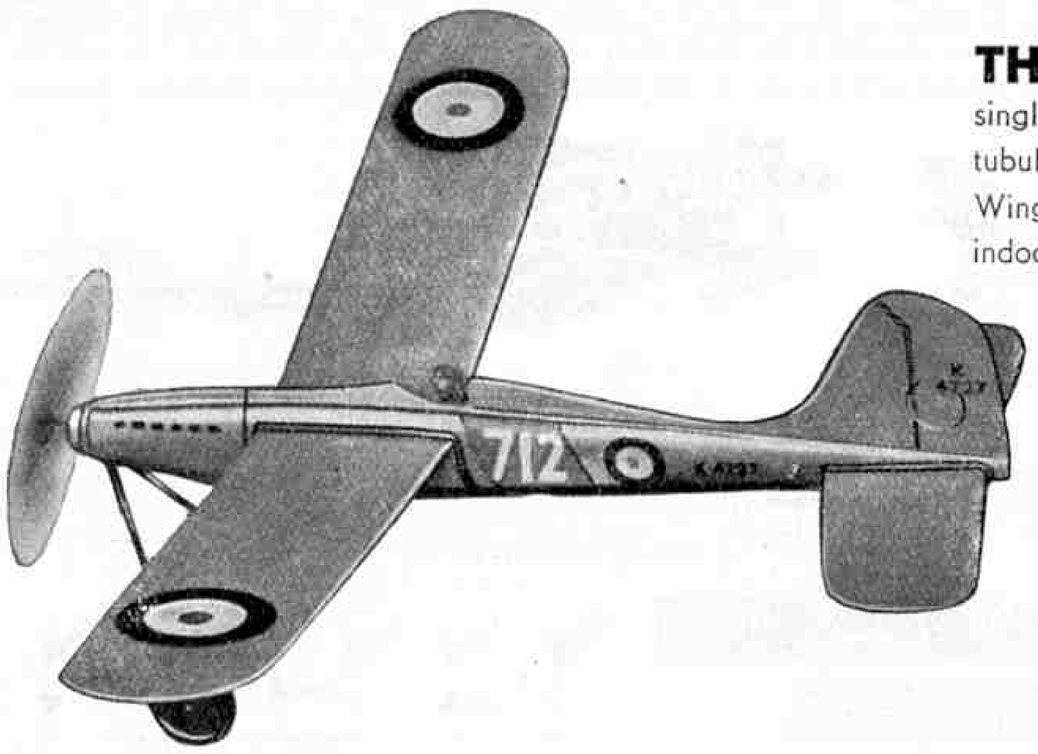


MECCANO LTD., LIVERPOOL 13

Every boy can have a **FROG** MODEL AEROPLANE

TRADE MARK REGD.

Model flying is now within the reach of every boy, for who cannot afford to pay a shilling for so fine a machine as the "Avenger." And at half-a-crown the "Silver Arrow" is a real bargain.



THE "AVENGER" Modelled on the lines of the latest type single-seater fighter with an exceptionally good performance. Streamline tubular fuselage and sprung undercarriage, new type unbreakable air screw. Wing span 11 in. Overall length 7⅞ in. The "Avenger" is specially designed for indoor or outdoor flying, and will fly nearly 200 ft. under good conditions. Price **1/-**

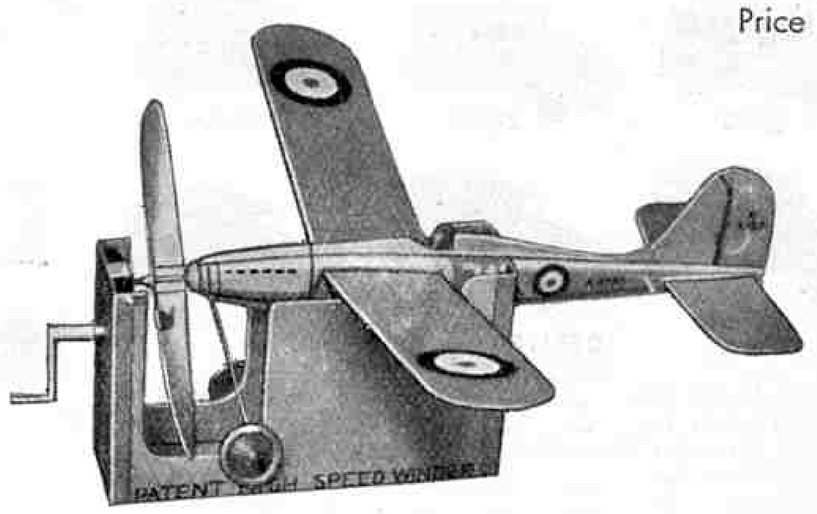


Illustration shows "Avenger" complete with Patent High-Speed Winder. Packed in attractive box. Price **1/11**

THE "SILVER ARROW" True to type with a good performance. Aluminium fuselage. Propeller and nose-piece detach in a crash. Accurate pitched propeller; adjustable controls; transparent windows. Wing span 16½ in. Spare motor and insertor rod. Double surface detachable wings. Price only **2/6**

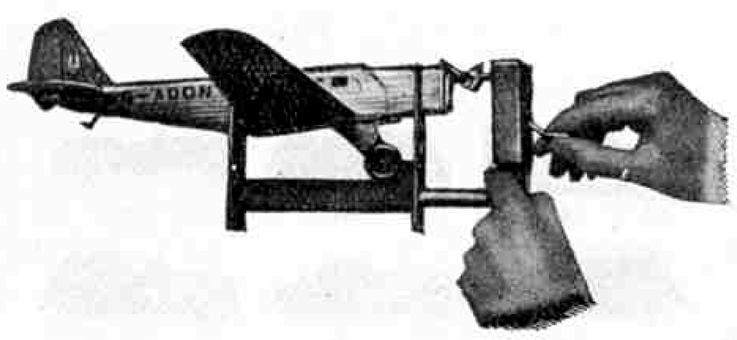
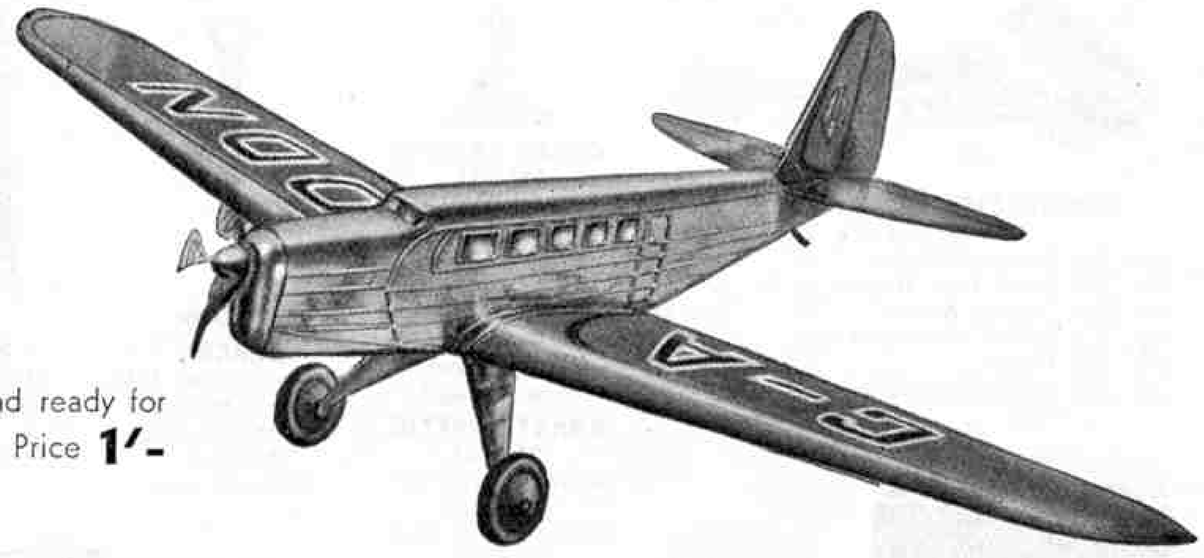


Illustration shows how easily the "Silver Arrow" can be wound ready for flight with the Patent Geared-up Hand Winder. Price **1/-**



OBTAINABLE AT ALL GOOD TOY SHOPS AND STORES

FROG MODEL AIRCRAFT

FROG Model Aircraft are covered by World Patents granted and pending. Made in England by International Model Aircaft Ltd.

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COUPON To Lines Bros. Ltd. (Dept. 5), Morden Road, London, S.W.19

Please send me your "Frog" coloured leaflet with particulars of the "Frog" Flying Club and how to obtain handsome enamelled "Frog" Pilot badges.

Name.....

Address.....

Please write in block letters. 7/37



DINKY TOYS

OVER 250 VARIETIES

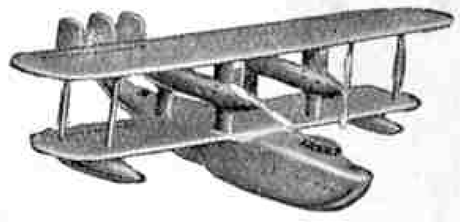
A FASCINATING COLLECTING HOBBY

Dinky Toys are the most realistic and the most attractive models in miniature ever produced. These wonderful toys are unique in their perfection of finish, and their range is so wide as to appeal to all tastes. A selection is illustrated on these pages. As will be seen, racing cars, motor vehicles, aeroplanes, railway signals, etc., are now included in the range. Many other models of equal interest are in preparation.

ASK YOUR DEALER FOR A COPY OF THE DINKY TOYS FOLDER, which gives illustrations and prices of the complete range.



60P



60H



60N

R.A.F. AEROPLANES
Dinky Toys No. 61

No. 60h "Singapore" Flying Boat ... ... each 1/-
No. 60p Gloster "Gladiator" Biplane (2) ... ... „ 6d.
No. 60n Fairey "Battle" Bomber (2) ... ... „ 4½d.
Price of complete set 2/9



280C



280D



280A



280F



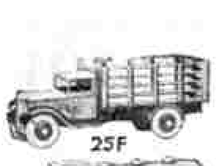
280E



280B

DELIVERY VANS
Dinky Toys No. 280

No. 280a Viyella Van ... ... each 6d.
No. 280b Lyon's Van ... ... „ 6d.
No. 280c Shredded Wheat Van ... ... „ 6d.
No. 280d Bisto Van ... ... „ 6d.
No. 280e Ekco Van ... ... „ 6d.
No. 280f Mackintosh's Van ... ... „ 6d.
Price of complete set 3/-



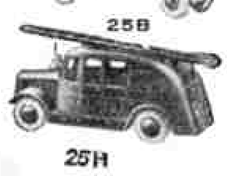
25F



25B



25D



25H



25E



25G

COMMERCIAL MOTOR VEHICLES
Dinky Toys No. 25

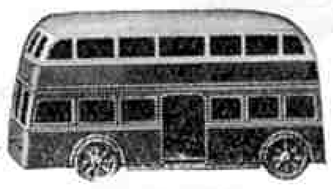
No. 25b Covered Wagon ... each 9d.
No. 25d Petrol Tank Wagon ... „ 9d.
No. 25e Tipping Wagon ... „ 9d.
No. 25f Market Gardener's Van „ 9d.
No. 25g Trailer ... ... „ 7d.
No. 25h Streamline Fire Engine ... „ 9d.
Price of complete set 4/3



ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47a
(Four-face)
Price 3d. each

ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47b
(Three-face)
Price 3d. each

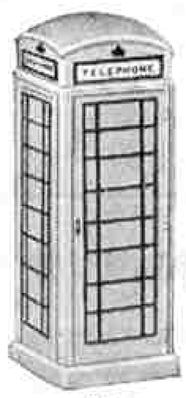
ROBOT TRAFFIC SIGNAL
Dinky Toys No. 47c
(Two-face)
Right-angle or Back-to-Back.
Price 3d. each



MOTOR BUS
Dinky Toys No. 29a
Assorted colours.
Price 4d. each

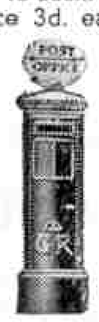


STREAMLINE TOURER
Dinky Toys No. 22g
Assorted colours. Fitted with rubber tyres. Price 4d. each



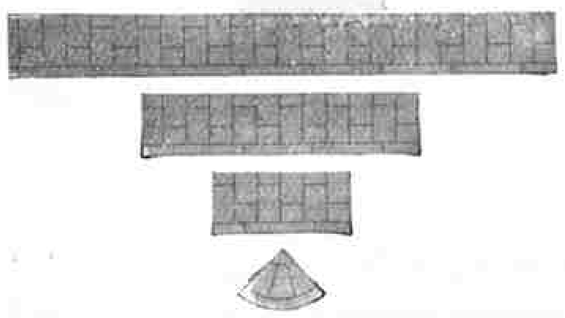
12c

TELEPHONE CALL BOX
Dinky Toys No. 12c
Price 4d. each



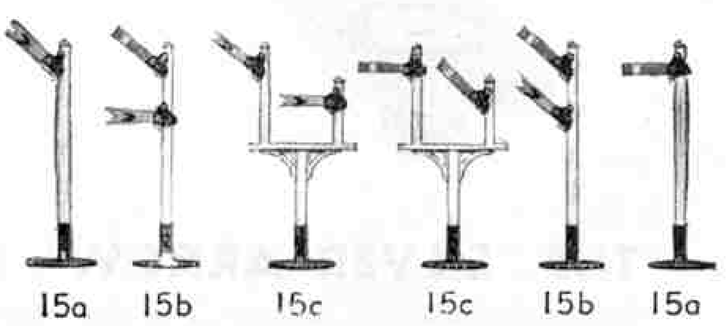
12a

PILLAR LETTER BOX G.P.O.
Dinky Toys No. 12a
Price 3d. each



PAVEMENT SET
Dinky Toys No. 46

The contents of this set, which are not supplied separately, are four 3-inch strips of pavement, six 6-inch strips of pavement, four 12-inch strips of pavement, and four quarter discs for corners.
Price of complete set 6d.



15a 15b 15c 15c 15b 15a

RAILWAY SIGNALS
Dinky Toys No. 15

No. 15a Single Arm Signal (2). "Home" and "Distant" each 2d.
No. 15b Double Arm Signal (2) combined. "Home" and "Distant" ... ... each 3d.
No. 15c Junction Signal (2). "Home" and "Distant" each 4d.
Price of complete set 1/6



BEACON
Dinky Toys No. 47d
(Realistic models of the Belisha Safety Beacons)
Price 1d. each



PILLAR LETTER BOX AIR MAIL
Dinky Toys No. 12b
Price 3d. each



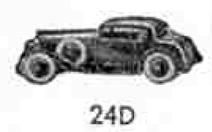
24A



24E



24G



24D



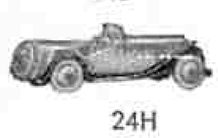
24B



24F



24C



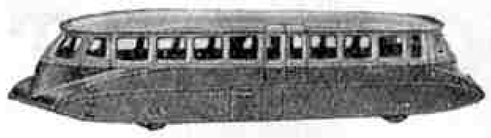
24H

MOTOR CARS
Dinky Toys No. 24

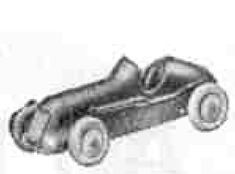
No. 24a Ambulance ... ... each 6d.
No. 24b Limousine ... ... „ 6d.
No. 24c Town Sedan ... ... „ 6d.
No. 24d Vogue Saloon ... ... „ 6d.
No. 24e Super Streamline Saloon ... ... „ 6d.
No. 24f Sportsman's Coupe ... ... „ 6d.
No. 24g Sports Tourer (4 seater) ... ... „ 6d.
No. 24h Sports Tourer (2 seater) ... ... „ 6d.
Price of complete set 3/11



HOTCHKISS RACING CAR
Dinky Toys No. 23b
Assorted colours. Fitted with rubber tyres. Price 4d. each



G.W.R. RAIL CAR
Dinky Toys No. 26
Assorted colours. Price 4d. each





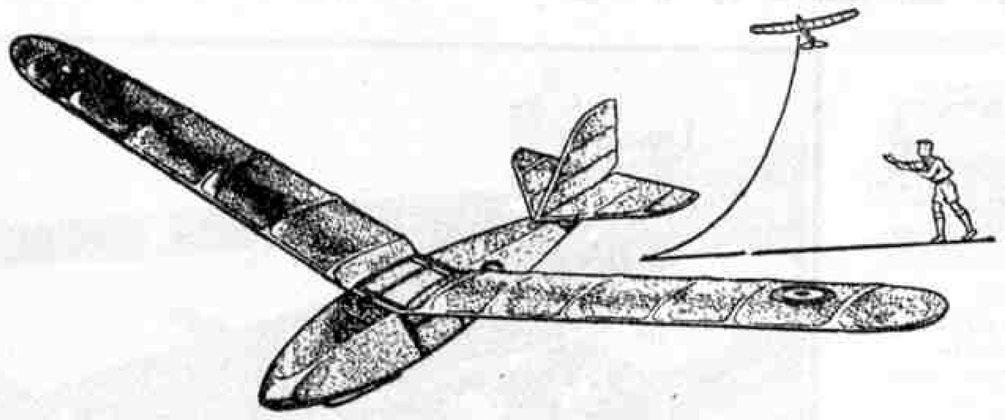


SMALL CARS
Dinky Toys No. 35

No. 35a Saloon Car ... ... each 3d.
No. 35b Racer ... ... „ 3d.
No. 35c "M.G." Sports Car ... ... „ 3d.
Price of complete set 9d.

MECCANO LIMITED — BINNS ROAD — LIVERPOOL 13

HIGH PERFORMANCE SAILPLANE



This splendid model from the **SCUD** range performs exactly like a full-scale Sailplane. It is the only British-made machine of its type made, and when correctly trimmed and under suitable weather conditions has soaring flight of up to ten minutes. This is definitely the machine for the enthusiast and will provide hours of instructive flying. **No propeller to wind. Nothing mechanical to go wrong.** Totally enclosed fuselage, mainplane and tail unit double surfaced, covered jap silk and doped silver. Skid under-carriage. Includes new catapult launching gear. Gliding angle in calm air, 1 in 15. Span 38". Price **17s. 6d.**

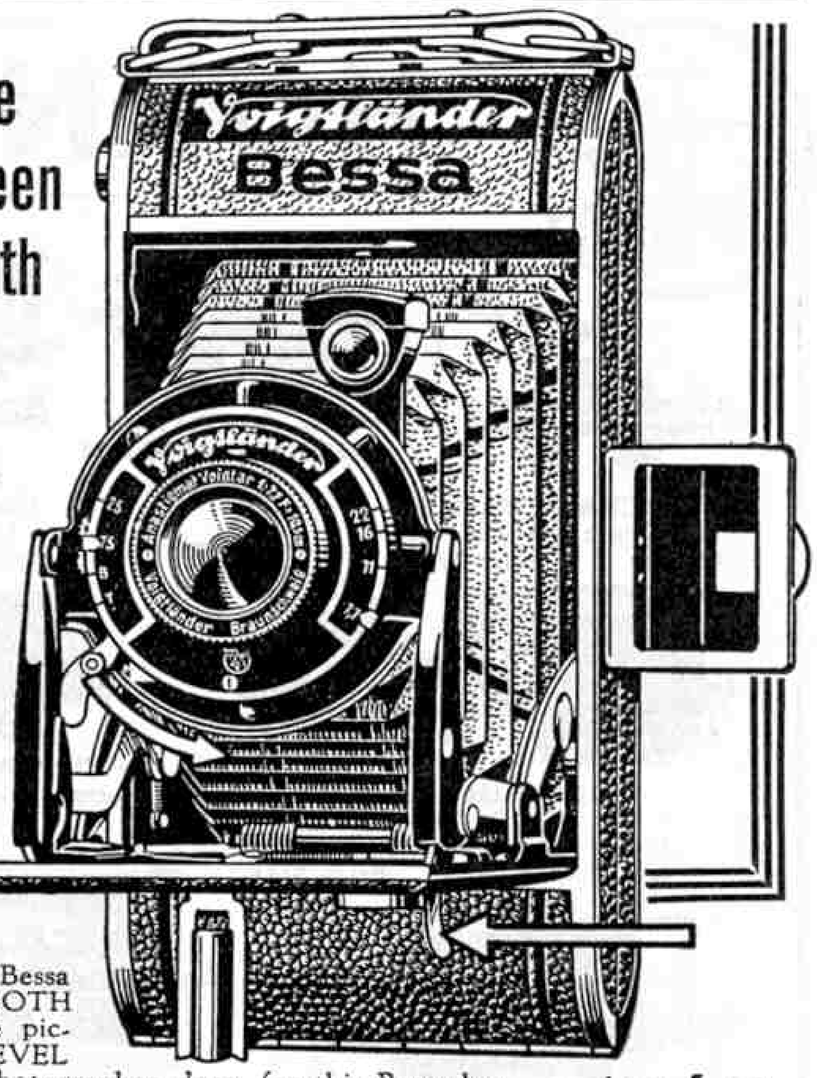
SEND NOW FOR ILLUSTRATED CATALOGUE DESCRIBING OUR 1937 RANGE

Stocked by leading dealers throughout the kingdom

SCUD MODELS LTD.

Lovaine Crescent Model Works, Newcastle-upon-Tyne

Never before has there been a Camera with ALL the Bessa's features —at the Bessa's low price



YOU hold the Bessa rock-steady in BOTH hands and take pictures at EYE-LEVEL like the press photographer does, for this Bessa has its shutter release fitted *under* the baseboard, so that one finger falls readily on to it. And the Bessa's advantages do not stop there. It is made to a quality-standard by a firm as old as photography, equipped with a first-class Voigtlander Anastigmat lens and a mask for half-size pictures. You can take 8 full-size 3¼"x2¼" or 16 half-size (V.P.) pictures on a standard spool! See the Bessa at your dealers or write for the Bessa brochure—it offers features never before known in a camera of its price!

52'6 with F/7.7 Anastigmat lens. Nine other models ranging from £9-12-6 with F/3.5 lens.

Voigtländer BESSA

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Bluemel's

Famous for Quality

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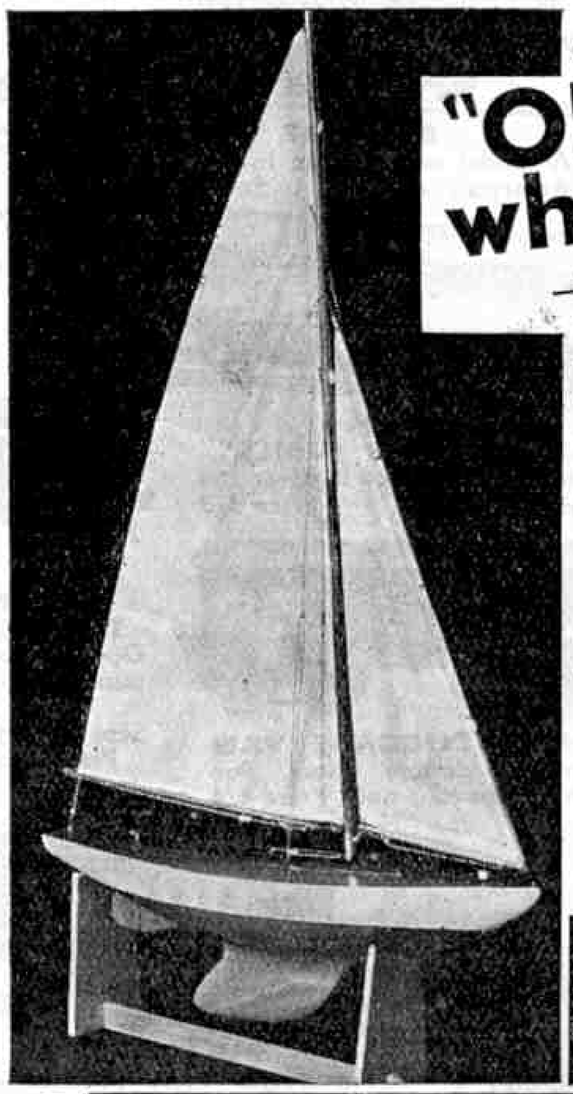
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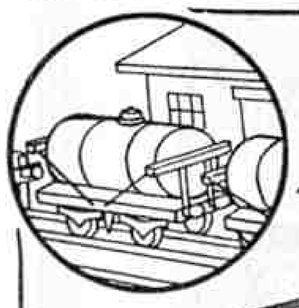
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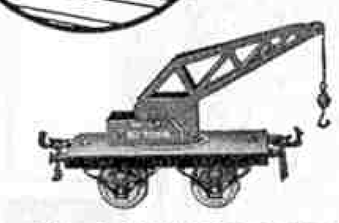
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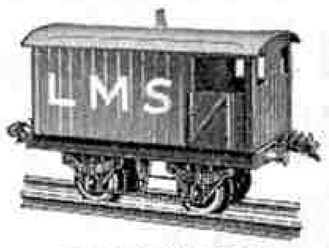
HORNBY ROLLING STOCK



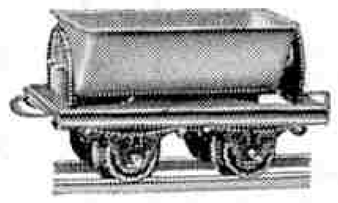
No. 1 CRANE TRUCK
The Crane revolves on its base. Price **2/11**



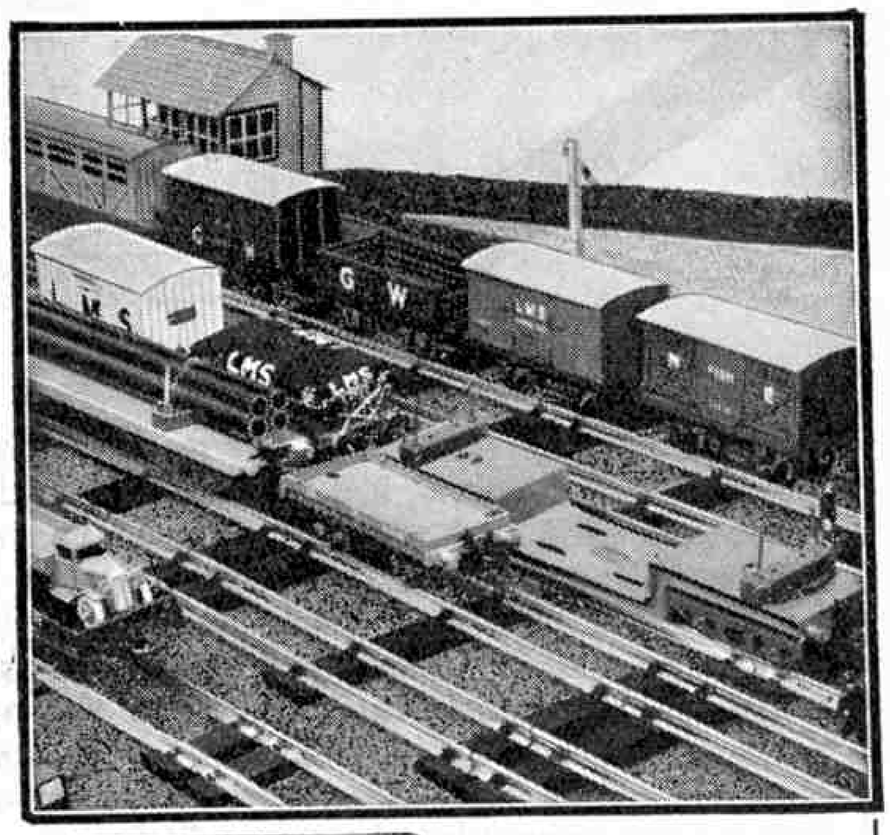
No. O ROTARY TIPPING WAGON
Price **1/6**

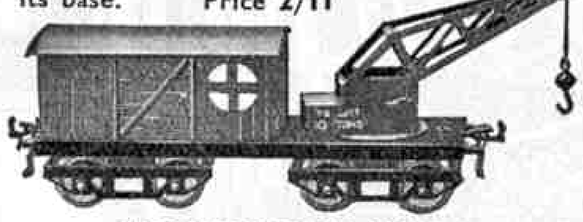


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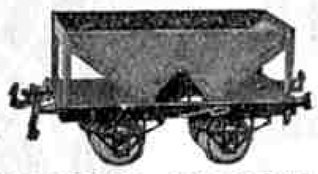


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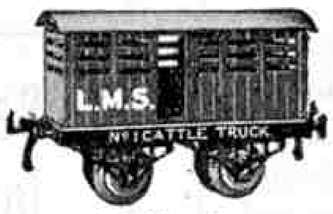




***BREAKDOWN VAN AND CRANE**
Sliding doors. For 2-ft. radius rails only. Price **5/11**



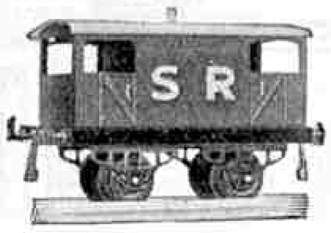
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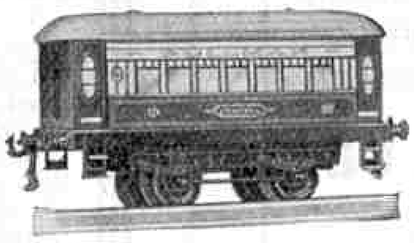
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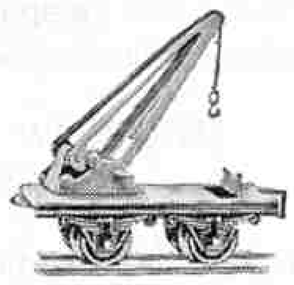
BRAKE VAN
Opening doors. In N.E. or S.R. lettering. Price **2/11**



COACH, No. 1 PULLMAN
Price **2/9**



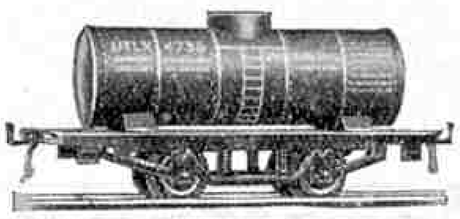
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Price **2/6**



***MO CRANE TRUCK**
Crane revolves on its base. Price **1/-**



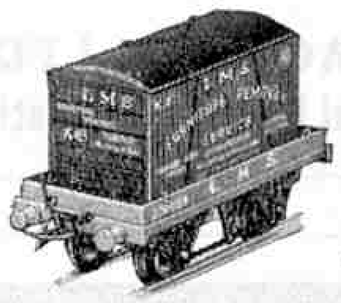
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"NESTLE'S MILK"
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As used in America for the conveyance of oil, etc. Price **1/9**

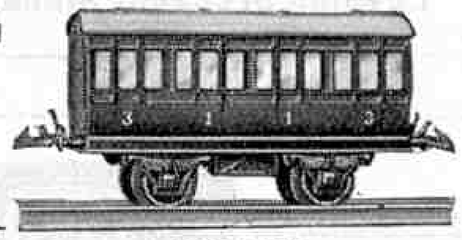


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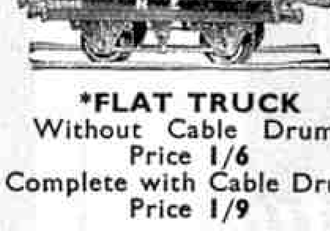
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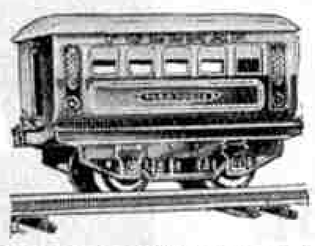


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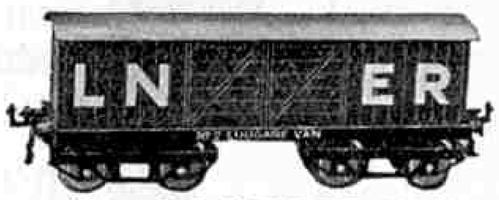
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Price **1/-**



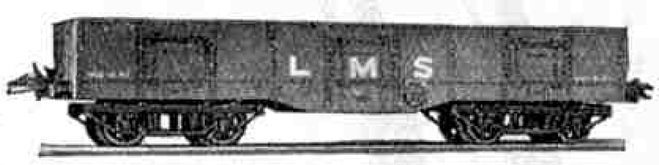
OIL TANK WAGON "ROYAL DAYLIGHT"
Price **2/-**



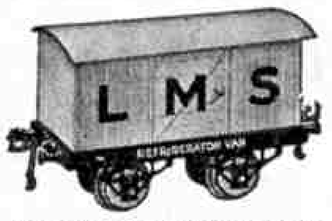
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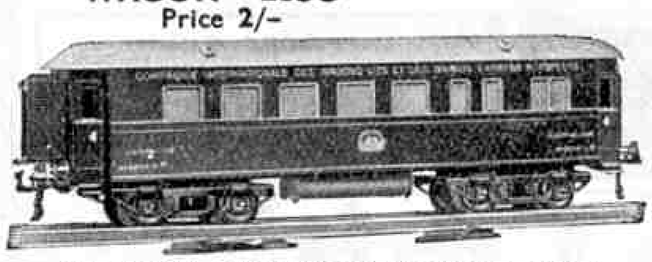
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Finished in correct colours of G.W.R. and L.M.S.R. "Loco Coal" Wagons, or L.N.E R. "Brick" Wagon. For 2-ft. radius rails only Price **3/9**



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Beautifully enamelled. Fitted with sliding doors. Price **2/9**



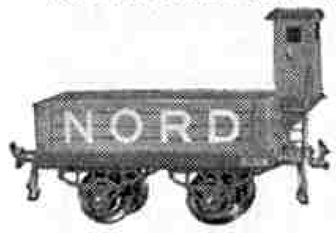
No. 1 PETROL TANK WAGON "ESSO"
Price **2/-**



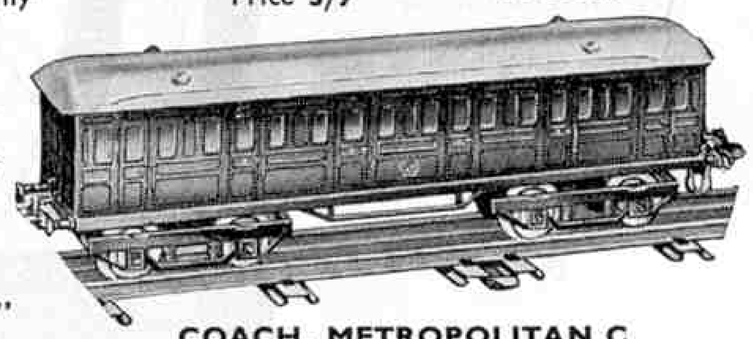
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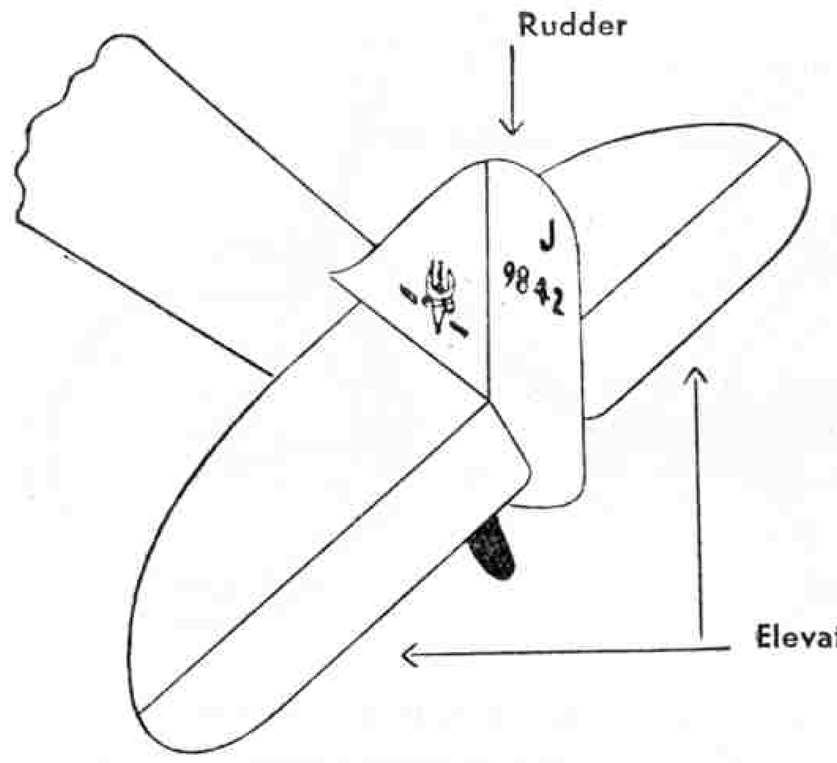
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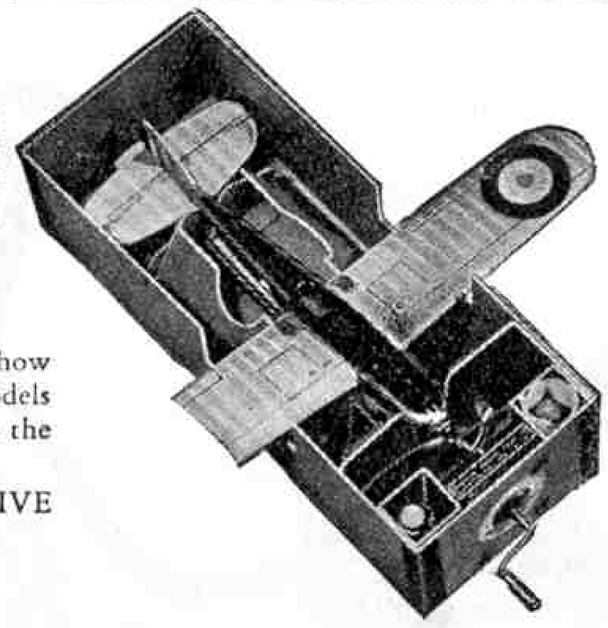
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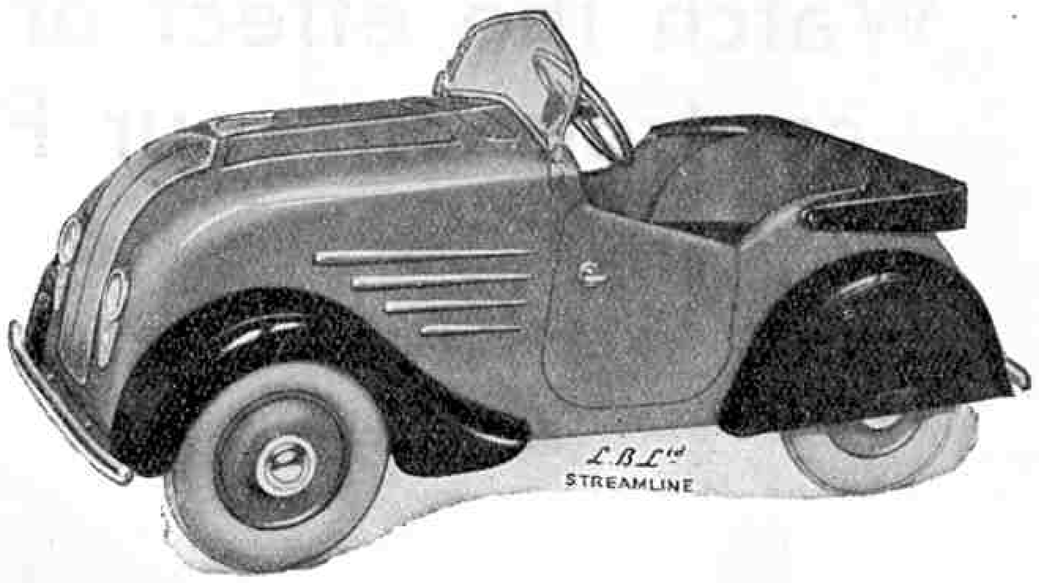


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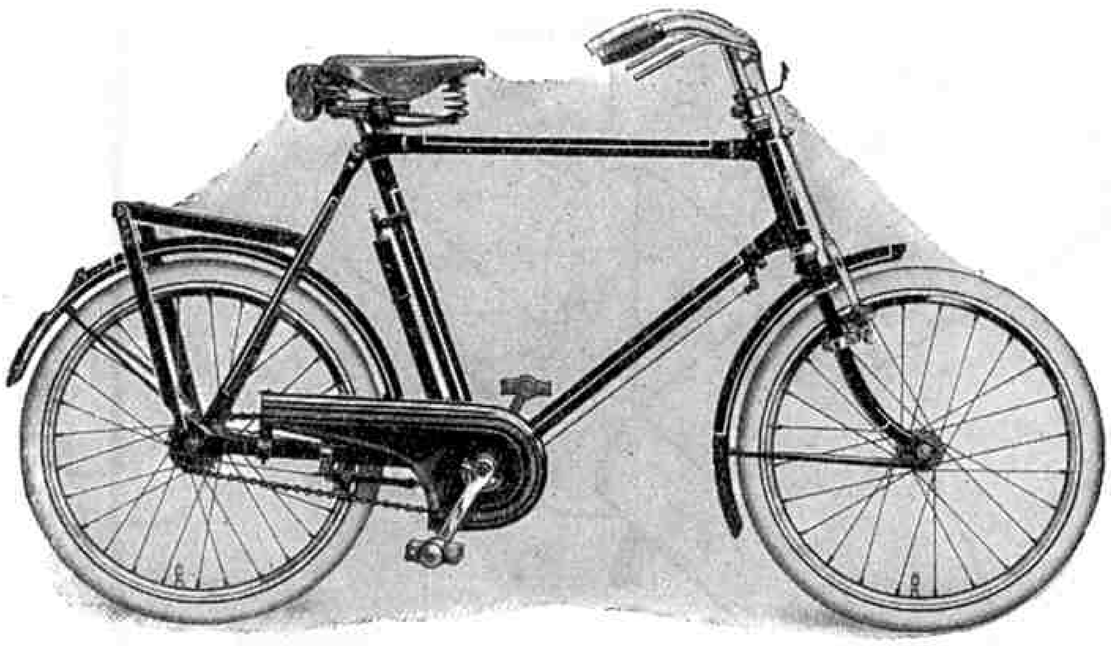
TRI-ANG SPORTS

Realistic streamlined model, with opening side door and luggage boot. 8 in. balloon disc wheels. ½ in. rubber tyres. Ball-bearing back axle. Plated bumper and streamline dummy side lamps. Windscreen, direction indicator and dummy hood. Length 41 in.



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Body of pressed steel. Crank drive on ball-bearing back axle. Facsimile airflow radiator with mascot. Dummy headlights. Pressed bumpers back and front. Adjustable seat. Latest type mudguards. 9 in. balloon disc wheels. ½ in. rubber tyres. Length 45 in.





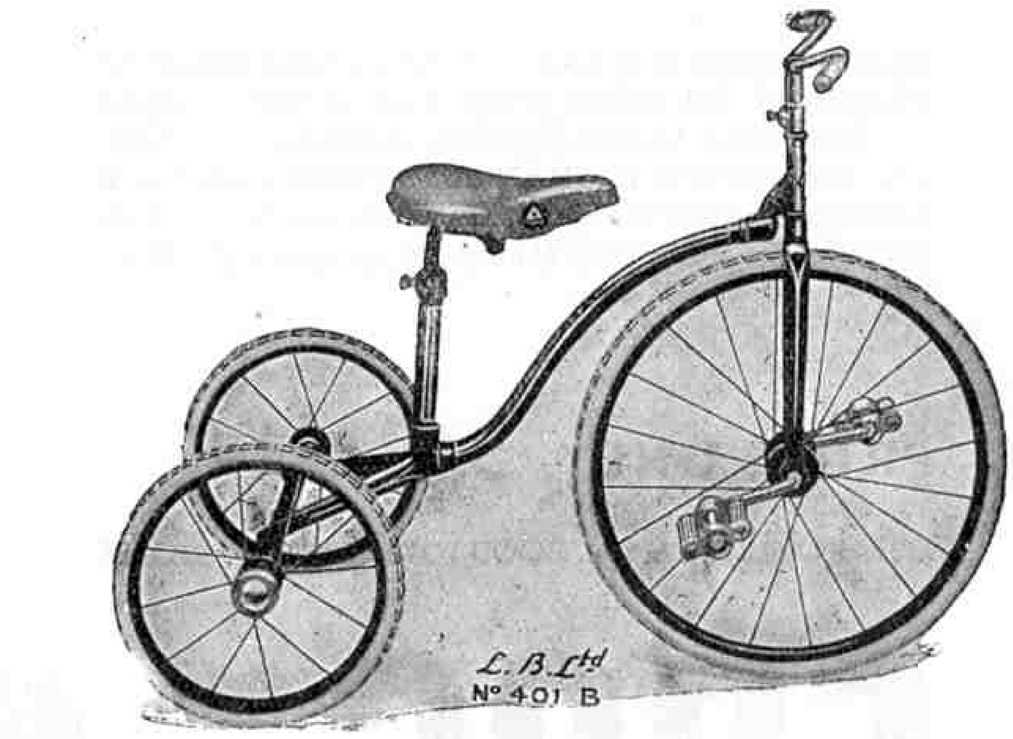
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NEXT MONTH: "THE ENGINEER IN THE AMUSEMENT PARK." PUBLISHING DATE: 31st JULY.

MECCANO MAGAZINE

Editorial Office:
Binns Road, Liverpool 13
England

Vol. XXII. No. 7
July, 1937

With the Editor

A Notable Railway Month

This month will be a notable one in British railway annals. It will see the beginning of new services between London and Edinburgh and London and Glasgow that will cut the times required for these long journeys to six hours and six and a half hours respectively. The locomotives and trains concerned in these services are themselves of outstanding interest and show well how progressive are British railway engineers.

The six and a half hours service between London and Glasgow is being introduced by the L.M.S., and the new train will commence running on 5th July. It is called *"The Coronation Scot,"* and is described as the company's great contribution to improved railway travel in Coronation year. A description of this fine train is given in the article on page 380 of this issue. As the photographs there reproduced show, the entire train is thoroughly modern and is equipped in the most luxurious style; but to most of my readers the outstanding feature will be the streamline locomotive *"Coronation,"* the first of five of this type to be built. These mighty locomotives, which are confidently expected to be capable of speeds of over one hundred miles an hour, will have no difficulty in maintaining the average speed of 61.8 miles an hour required of them for the journey, although they will have to climb Shap Fell, and the Beattock incline that rises to a height of over one thousand feet.

Fastest Train Journey in the Empire

For the new service between London and Edinburgh the L.N.E.R. are introducing new high-speed streamline expresses that will stop only at Newcastle in the up direction and at York on the down journey. Railway history will be made by the down train on its run between King's Cross and York, for between these points it will travel at an average speed of 71.9 m.p.h., completing the 188 miles in 157 minutes. This will be the fastest train journey in the British Empire, and it has been made possible by the capacity of the streamline locomotives specially designed by Sir Nigel Gresley. The whole train will be streamlined from the front of the engine to the tail lamp.

Yet a third achievement that makes July noteworthy is the electrification of the main line of the Southern Railway from London to Portsmouth. This adds 95 route miles to the total already electrified on that railway. The change is being made just in time to deal with the summer holiday traffic to Southsea and the Isle of Wight, which is always extremely heavy.

An Outdoor Number

There is a real outdoor atmosphere about this issue. The article on outboard motors on page 388 shows how easily an engine of this type can be attached to even the smallest boat. With a boat so fitted a glorious camping holiday is possible, with fresh trips by water every day. I hope many readers will take up this splendid sport, and I should be glad to give advice on any difficulties that may arise. On page 390 Mr. Arthur Lamsley describes the magnificent yacht *"Endeavour II,"* with which Mr. T. O. M. Sopwith hopes to regain the *"America's Cup."* The yacht, designed by Mr. Charles Nicholson, is an all-Empire production, and is a triumph of craftsmanship. This is Mr. Sopwith's second attempt to win back the famous trophy, and I am sure that all readers will join me in wishing him success.

Holidays on the lakes and in the forests of Finland form the subject of Mr. L. Hugh Newman's article on page 414. Finland is a glorious country in summer, and the friendly Finns are always ready to give a warm welcome to visitors. Finally, Mr. O. S. Nock tells us of his visit to the Scilly Isles, that fascinating group of islands lying about twenty-five miles south-west of the Land's End.

Prizes for Holiday Letters

Most readers will be on holiday during July and August, and I shall receive the usual large number of letters from them telling me of the splendid times they are having and describing some of the interesting and unusual things that they see. I am certain that I should receive even more letters but for the summer laziness that attacks so many of us at this time of the year! I want to help my readers to overcome this unfortunate effect of the holiday season, and so I am offering prizes of two guineas, one guinea and 10/6 respectively for the three most interesting letters describing holidays that I receive by 30th September. There will also be several consolation prizes of five shillings.

I want every reader to enter this friendly contest. Many of them may not meet with any particularly stirring adventures during their holidays, but a keen boy can extract just as much interest and amusement from a very ordinary holiday as if he had gone further afield and had a more novel and exciting time. It is upon the interest of the letters, and not the actual adventures, that I shall rely in judging the letters that reach me.

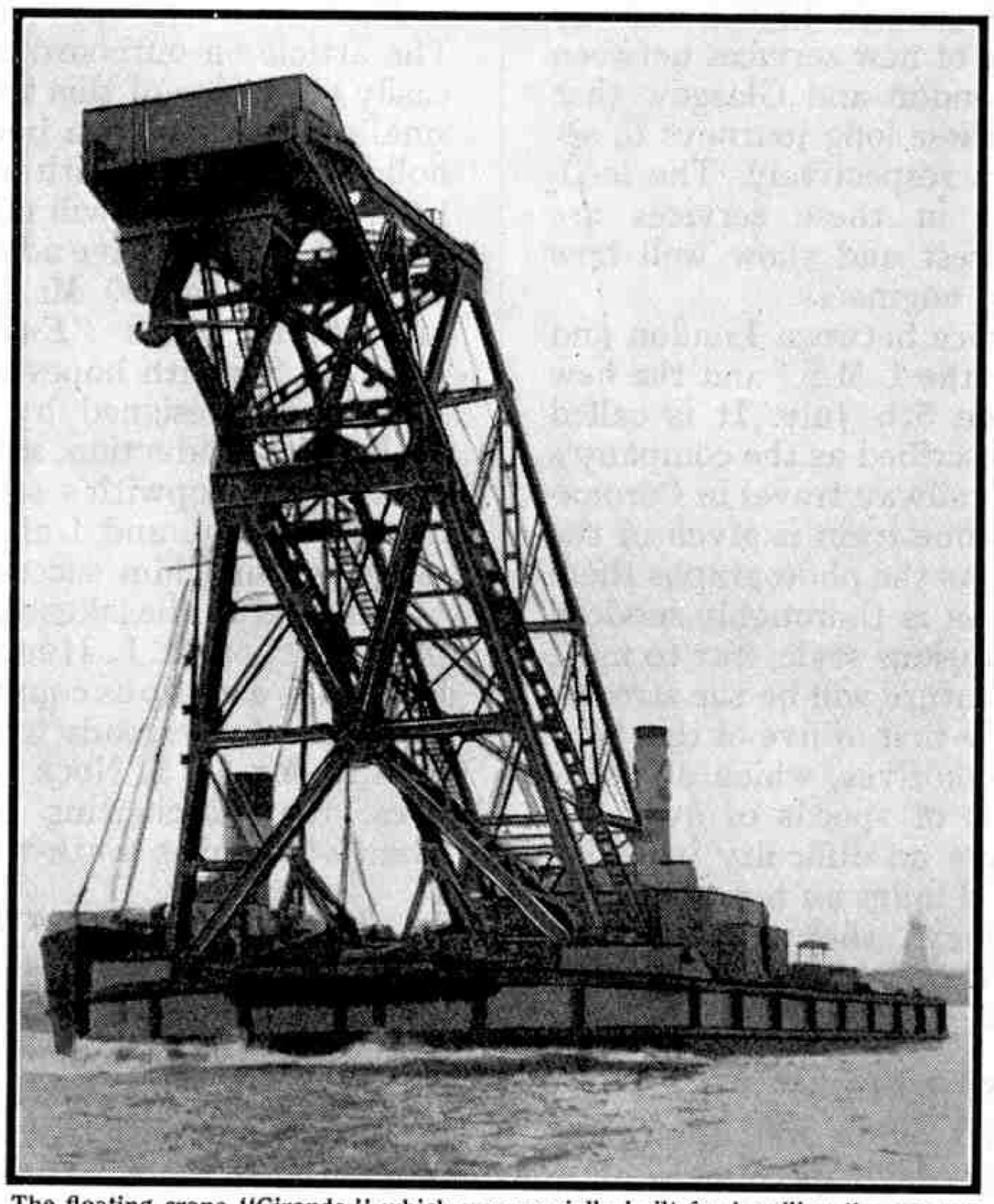
I look forward to being overwhelmed with entries, and it is safe to say that I at least shall not be able to indulge in any summer laziness!

Building a Modern Harbour

Floating Crane that Lifts 290-Ton Piles

THE engineer has won many of his greatest triumphs by building harbours in which ships can find shelter from stormy seas while unloading their cargoes or discharging passengers. There are many splendid natural harbours, such as Milford Haven, in Wales, which stretches inland for 10 miles, and Rio de Janeiro Bay, in South America, which is almost entirely surrounded by mountains and is 15 miles in length and has a width varying from two to seven miles. Many coasts are not favoured in this manner, however, and the engineer has been compelled to exercise all his skill to provide refuge for shipping on them, usually by building huge breakwaters.

Even where a safe harbour is provided by a sheltered bay or a river estuary, the construction of the necessary harbour works is not always a simple task. For instance, in an estuary the sandy or muddy bottom may not be suitable as a foundation for these, and huge piles then have to be driven to a great depth in order to carry the weight securely. An excellent example of engineering work of this kind is to be seen at Le Verdon, at the mouth of the Gironde, the French river that flows into the Bay of Biscay. There a great new port has been built entirely upon giant concrete piles, many of which weigh nearly 300 tons, and by means of a huge crane these were placed in position in a novel and striking manner that is of the greatest interest as an illustration of the resource of the modern engineer.



The floating crane "Gironde," which was specially built for handling the concrete piles used in the making of Le Verdon Harbour. For the illustrations to this article we are indebted to Werf Gusto, Firma A. F. Smulders, Schiedam, Holland.

The new port is a development of that of Bordeaux, which in recent years has become of great importance as a calling place for great liners and other ocean-going vessels. Bordeaux is 60 miles from the sea, for it stands on the left bank of the Garonne, a tributary of the Gironde, and vessels bound for the port therefore have to make a long and tedious river trip. Extensive dredging operations have been carried out, and the equipment of the port has been modernised in order to speed up work as much as possible. The need for navigating the long stretch of river remained a serious hindrance, however, and finally the bold step was taken of planning the new port at Le Verdon, to be connected with Bordeaux by a fast train service. Constructional work was begun in 1929, and the completed harbour was opened for service in 1933.

The new port has a mole or landing jetty, 870 ft. in length and 102 ft. in width, on each side of which a liner as large as the "*Normandie*" could be accommodated. The mole is connected with the shore by a curved viaduct more than 1,000 ft. in length. This is crossed by the railway from Bordeaux, which ends at a large station built on the mole, and thus alongside liners and other vessels berthed there. The entire structure is supported on piles. The mole is built in five sections in order to allow for expansion and contraction due to changes of temperature, and each section rests on four rows of three piles each. The viaduct also is divided into sections and is carried by two rows of piers.

The piles used in the beginning of the work were 58 ft. 6 in. in length and weighed 175 tons. Certain difficulties that were met with at a later stage made it necessary to use even larger piles, however, and giants 72 ft. long and weighing 290 tons were then cast. These piles were cast in hollow form, with widened bases, and their thick walls were reinforced by rings of stout steel rods. Each pile contained six tubes, 10 in. in diameter, placed symmetrically round its inner surface, and in the tubes were pipes for delivering compressed air to the foot of the pile. These fittings were for use in sinking the piles into the sand on which the port was built.

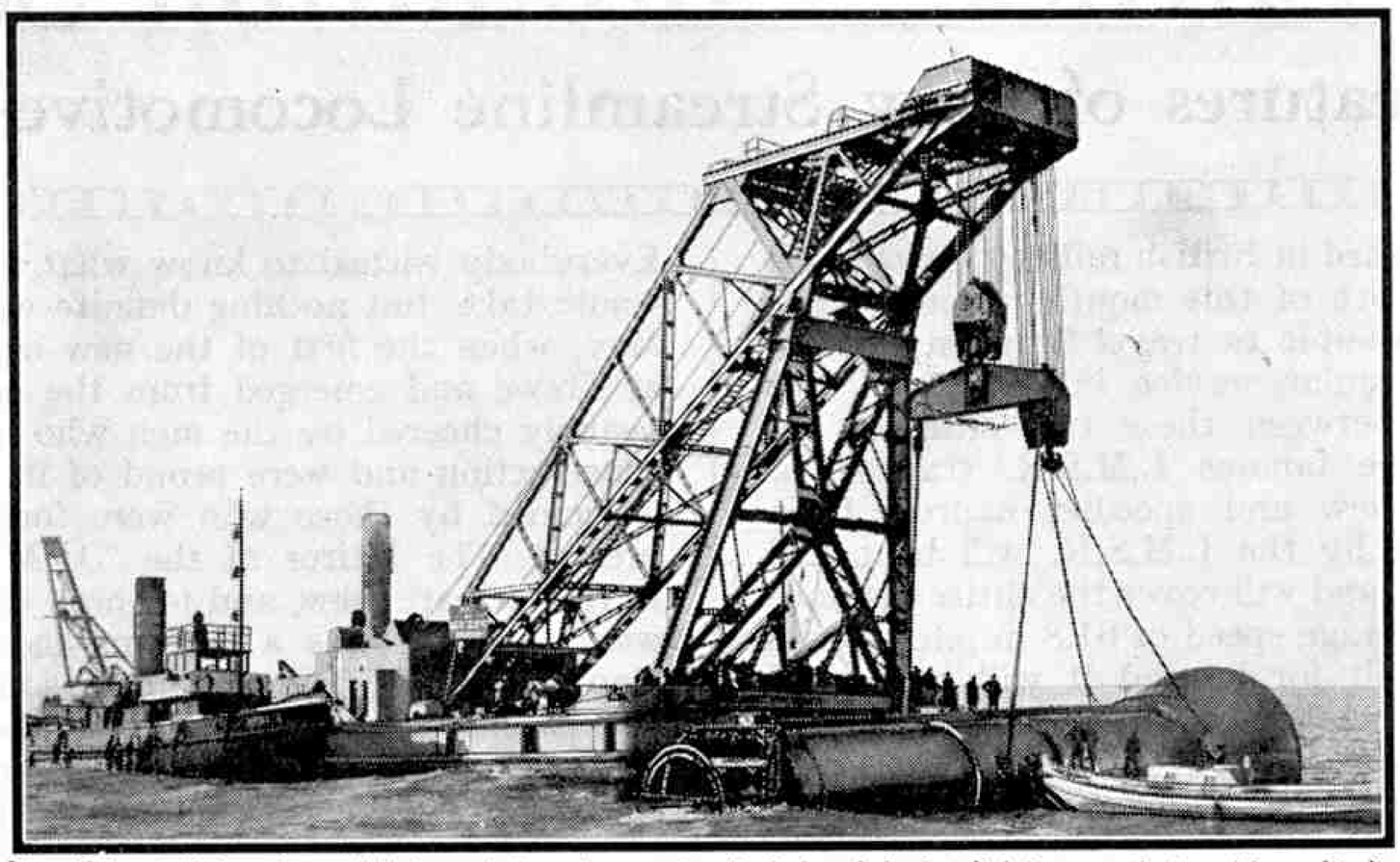
The piles were made in a special yard provided with 20 casting bays. The concrete was carried by means of portal cranes to the forms in which they were cast, and was poured with great care, uniform density being ensured by vibrating the forms with pneumatic shakers as they were filled. Each pile when completed was fitted with blank ends and left to season.

When the piles were ready they were conveyed on trucks to an inclined slipway and launched into the sea. The huge floating crane shown on our cover then took charge of them. This crane was specially designed for the purpose and was built by Werf Gusto, Firma A. F. Smulders, Schiedam, Holland. A general view of it is shown in the illustration on this page, and in the upper illustration on the opposite page it is seen carrying a pile that has just been lowered to sea level before being placed in position.

The pontoon of this floating crane is 112 ft. long and almost 50 ft. wide, and is divided into 15

compartments by means of bulkheads. Some of the compartments contain 150 tons of solid ballast, and provision is made for introducing an equal weight of water ballast in others. The normal draught is about 4 ft., and this becomes 8 ft. 9 in. at the front when the crane is fully loaded.

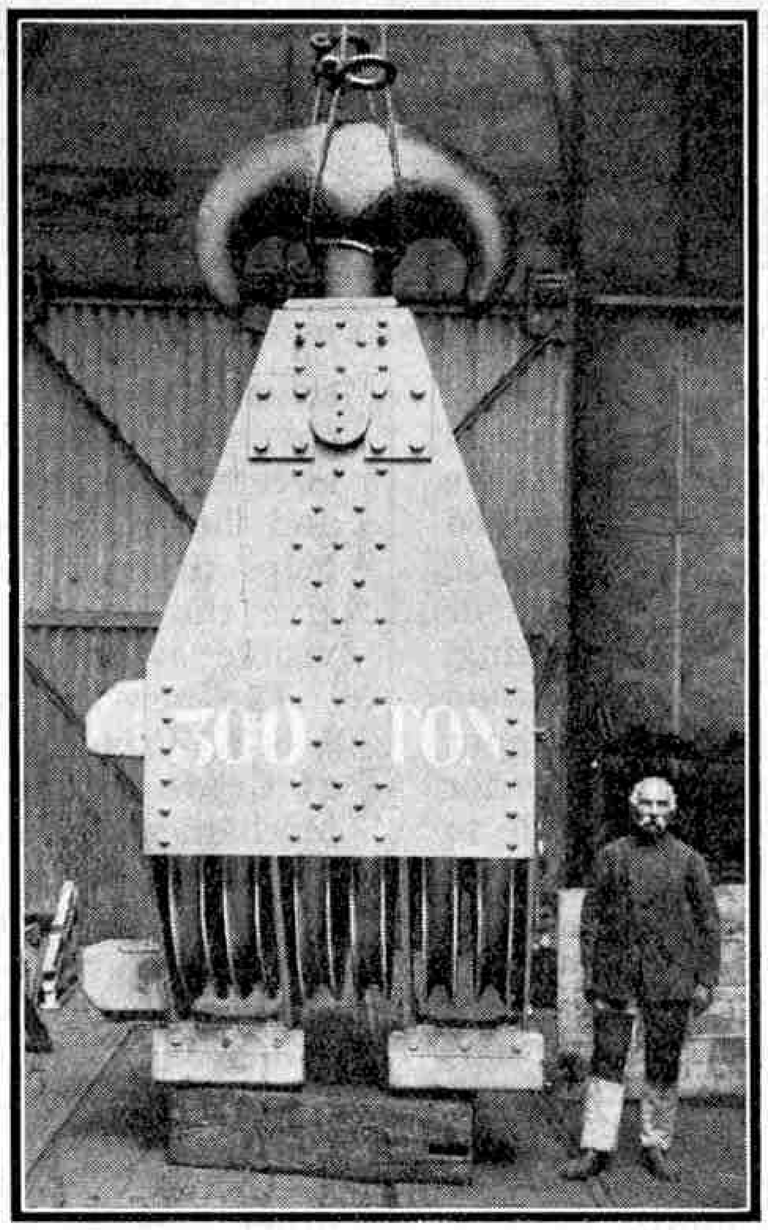
Each of the two lifting blocks has a capacity of 225 tons. If desired they can be used together, and the maximum lift then is 300 tons. Two winches are used for hoisting, giving a working speed of about 2 ft. 9 in. per min., with a height of lift of 68 ft. The winches are driven by a vertical steam engine and are connected by a friction coupling, so that they can be used independently or together, as desired, while one may be locked on the shaft and the other braked during the lowering operation. The auxiliary equipment of the crane includes an electric generating set and two air compressors.



The "Gironde" lowering a 290-ton reinforced concrete pile before bringing it into a vertical position with its wider end resting on the ocean bed.

At the foot of the launching slipway each pile was secured to the two lifting hooks of the floating crane. One hook was attached to the pile at a point near its base, and the other to a movable trunnion half way along it. Thus the pile was held horizontally and was carried to its place in this position. There the hook supporting the base was lowered, so that the pile became upright and could be stood on its base on the sea bed.

A pile of this kind usually is sunk into the ocean bed by removing material inside it in successive stages by means of a grab bucket, the weight of the pile causing it to descend as excavation continues. This is slow work, several days often being required to sink a single pile, and the method could not be used in the exposed estuary of the Gironde, where a violent storm might have arisen unexpectedly, perhaps at a critical stage. The piles had to be sunk rapidly, so that the work could be completed within brief periods, during which calm weather could be counted upon, while the intricate operations were carried out.



The main hoisting block of the floating crane "Gironde." It is capable of supporting a load of 300 tons.

Instead of removing the sand inside the piles by ordinary excavation methods, therefore, it was blown out by compressed air. This was pumped at a pressure of 35 lb. per sq. in. down the piping in the tubes on the inner surface of the hollow piles. Each pile was fitted with a sleeve at its base which the compressed air entered before bursting out through 36 inclined openings to churn the sand into an emulsion with water. The mixture was then sucked out.

As soon as the crane had set a pile in its correct position on the sea bed, the crew connected the couplings between the pipes and the compressed air plant on board the floating crane, and pumping operations then began. Sometimes obstacles were met with that had to be cleared by a diver, but in general, progress was fairly rapid and the piles often sank 3 ft. into the sand in an hour. The rate at which they were settled into the ocean bed was increased as the work continued. In some instances only five to nine hours intervened between the launch of a pile and the completion of sinking operations, and of this time two hours were occupied in transporting the pile and manipulating it into position.

The sinking was continued until the lower edge of the pile penetrated to a depth of 1 ft. or 2 ft. into the clay underlying the sand. Great care was taken to keep each pile upright. At the top of each was fixed a steel platform carrying an inclinometer, consisting of a pendulum hung over a horizontal plate, and this showed automatically when a pile began to lean to one side as it was being sunk. It was then brought upright again by suitable manipulation of the air jets.

When a pile had been driven down to a sufficient depth its base was sealed by a deposit of concrete laid under water. Then the water remaining in it was pumped out and concrete poured in its place. Thus the hollow pile was transformed into a gigantic solid cylinder.

A concrete cap measuring 12 ft. along each side, with an interior circular section of 11 ft. diameter was then placed on top of each pile. Each cap weighed from 50 to 60 tons, and their purpose was to provide bearings for the beams connecting the piles and supporting the decks of the dock structures built on them. As the depths to which the piles were driven varied slightly, the caps had to be specially made so that their upper surfaces were at exactly the same height, and thus provided a level foundation.

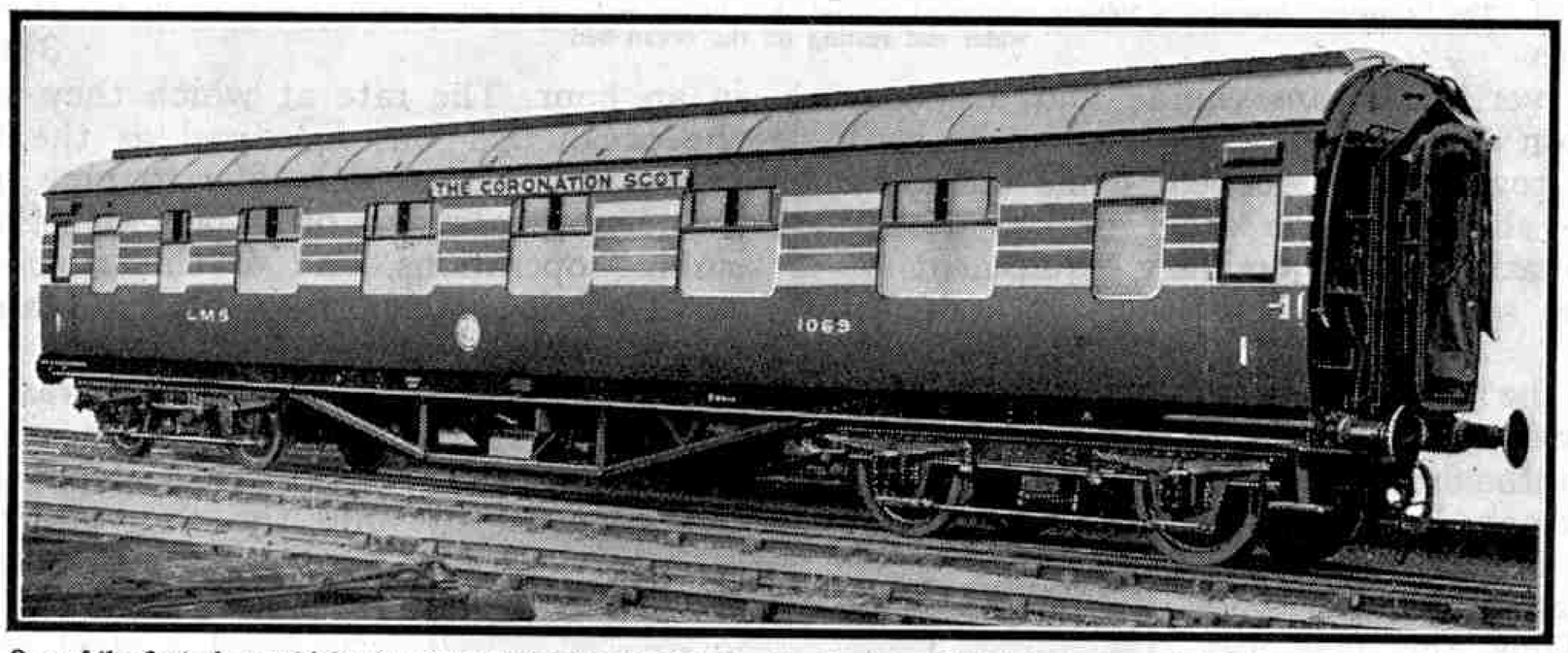
The L.M.S. "Coronation Scot"

Features of New Streamline Locomotives

A GREAT step forward in British railway history will be made on the 5th of this month, when for the first time it will be possible to travel between London and Glasgow by a regular service in 6½ hours. The present fastest time between these two cities is the 7 hr. 35 min. of the famous L.M.S.R. train *"The Mid-day Scot."* The new and speedier express train now to be introduced by the L.M.S.R. will be called *"The Coronation Scot,"* and will cover the entire distance of 401½ miles at an average speed of 61.8 m.p.h. Special coaches have been built for it, and it will be hauled by new streamline locomotives, the first of which has been named *"Coronation."*

The introduction of *"The Coronation Scot"* is the direct result of the record non-stop runs between Euston and Glasgow that were made last November, when the standard 4–6–2 locomotive No. 6201, *"Princess Elizabeth,"* with Driver Clarke in charge, made the northward journey in 5 hr. 53 min., and returned to Euston in 5 hr. 44 min. The run southward from Glasgow to Euston was made at an average speed of exactly 70 m.p.h., a world record for long-distance non-stop steam travel. These runs indeed were arranged in order to test the idea that the journey could be made in 6 hours with standard stock. They were made without a stop and well within the provisional 6-hour timing. It may therefore be wondered why *"The Coronation Scot"* is to make a stop, although taking half an hour longer for the journey. The explanation is that for convenience in operation it has been found desirable to interrupt the run at Carlisle, even though the same engine works throughout the journey, and the 6½ hr. schedule will give an ample margin for any time recovery that may have to be observed. It is interesting to know that there actually were about 50 speed restrictions in operation on the route during the *"Princess Elizabeth"* runs. All of these were carefully observed, just as they would be in ordinary service, and the maximum speeds also were kept within the usual limits.

There was great excitement among railway enthusiasts when it was announced that the new high-speed trains were to be hauled by streamline 4–6–2 locomotives specially built for the service, for the L.M.S.R. had not previously built any locomotives of this type, and the record trip already mentioned was achieved by a standard non-streamline locomotive. Everybody wished to know what form the streamlining would take, but nothing definite was learned until 25th May, when the first of the new engines was completed at Crewe and emerged from the erecting shop. It was heartily cheered by the men who had taken part in its construction and were proud of it, and no less heartily welcomed by those who were fortunate enough to be present. The Editor of the *"M.M."* had been invited to this private view, and for him, and indeed for all who were there, it was a thrilling moment when the new giant emerged. The engine was appropriately named *"Coronation"* and bore the number 6220, and in its Coronation colours of blue and silver it made a brilliant spectacle. The general colour of the engine is a bright blue, and silver bands spring from a "V"-shaped point at the front end and continue horizontally along the sides of both engine and tender.

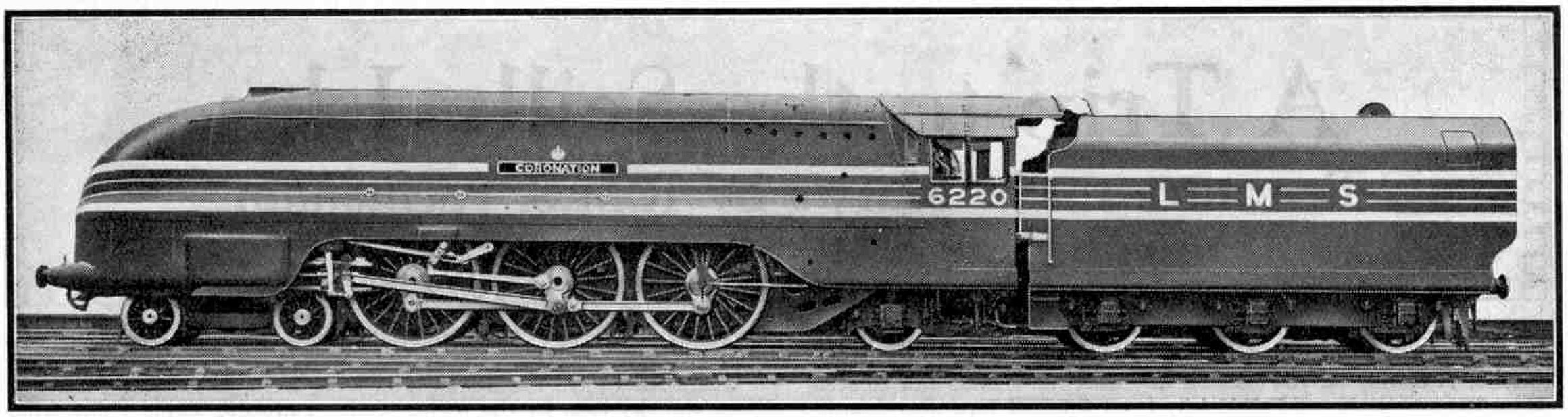


One of the first-class vehicles for "The Coronation Scot," described in this article. The cars are finished in blue with horizontal silver bands between the windows. The illustrations to this article are reproduced by courtesy of the L.M.S.R.

The simplicity and straightforwardness of the streamline casing is well suited to the display of this striking colour scheme. This casing is brought low at the front so as to cover the buffer beam and cylinders, but its lower edge sweeps upward behind the cylinders to leave the motion and the greater part of the driving wheels exposed. This helps to keep the rods and motion cool, and helps to give the engine an impressive appearance by leaving visible evidence of mechanism.

The new engines are a development of the famous 4–6–2 "Princess" class, and like them have been built at Crewe to the designs of Mr. W. A. Stanier, Chief Mechanical Engineer of the L.M.S.R. They have larger boilers, however, and certain improvements have been made to the frames and to the motion. The greatest novelty of course is the streamlining, and the form this takes was finally decided after very careful wind tunnel experiments with models in the L.M.S.R. Research Department at Derby.

The boiler has a tapered barrel, and the total heating surface is 2,807 sq. ft., against the 2,314 sq. ft. of the other 4–6–2s. A notable increase has been made in the superheater surface, which is 856 sq. ft. instead of the 653 sq. ft. of the earlier class. Similarly the grate area has been increased to 50 sq. ft., or 5 sq. ft. more than that of the other engines. The working pressure is 250 lb. per sq. in., and four Ross Pop safety valves are fitted. The boiler is fed by means of two injectors and the feed is discharged through clack valves on top



L.M.S.R. No. 6220, "Coronation," one of the new streamlined 4-6-2 locomotives specially built to haul "The Coronation Scot." The locomotive and coaches are finished in blue, and horizontal silver bands run along the entire train.

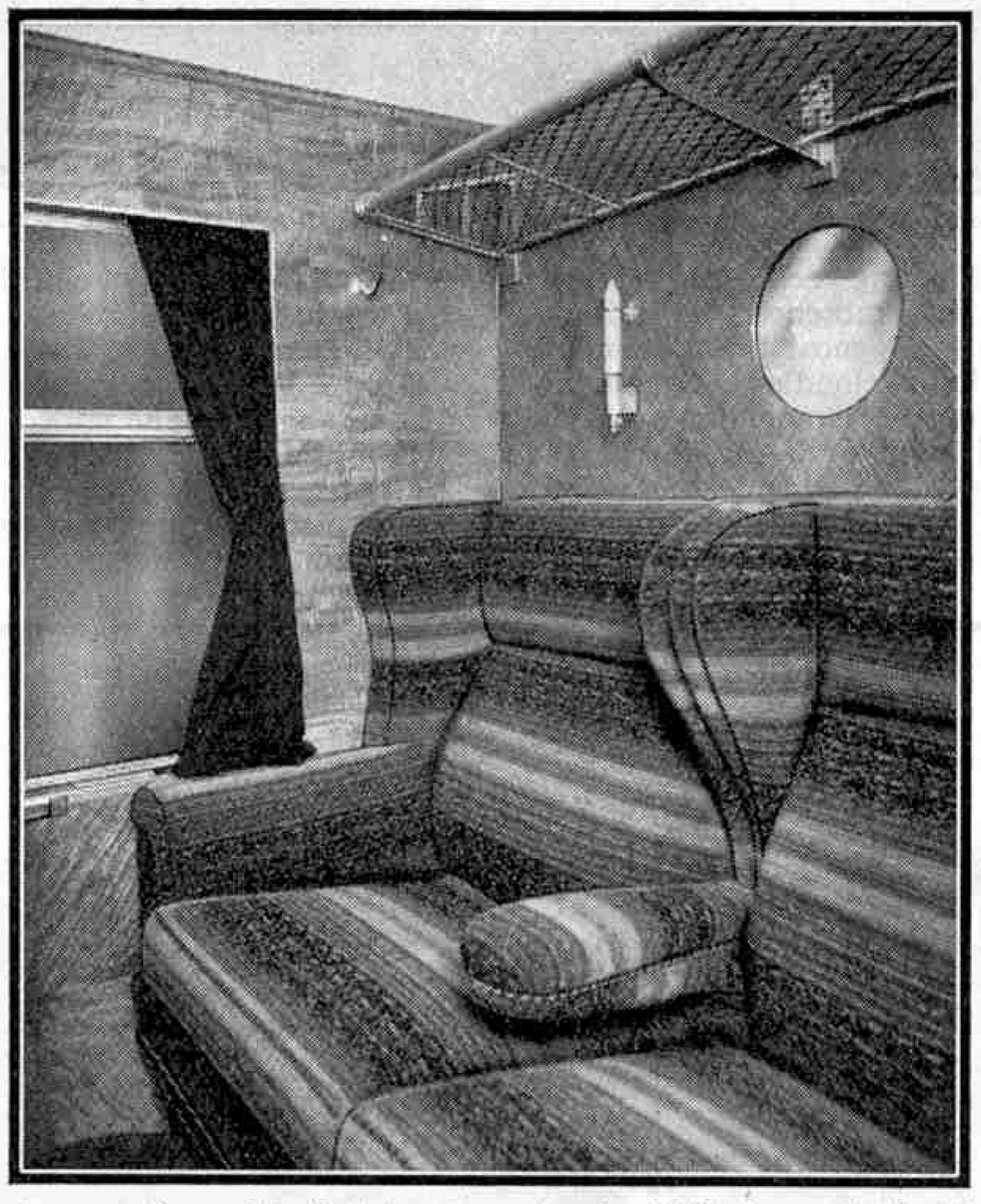
of the boiler barrel in front of the dome. In the dome is located the regulator valve, and baffle plates are provided to prevent water from lifting and entering the steam pipes.

There are four cylinders, as in the previous 4–6–2 locomotive, but they are 16½ in. in diameter instead of 16¼ in. The piston stroke remains the same, at 28 in. The position of the outside cylinders is slightly altered and instead of the four sets of Walschaerts' valve gear there are now only two, one set being provided to each of the outside cylinders. These operate directly the long-travel piston valves of the outside cylinders and the movement of the inside valves also is provided for by means of rocking levers.

The piston valves, which have a slightly shorter travel than before, are specially designed for lightness and each is provided with six narrow rings to ensure steam tightness. The inside cylinders are set well forward between the frames and drive the leading coupled wheels, while the outside cylinders drive the centre pair. The coupled wheel diameter has been increased by 3 in. to 6 ft. 9 in. The front end of the engine is carried on a four-wheeled bogie, side bolsters transmitting the load from the main frames to the bogie. The trailing two-wheel truck is of the Bissel type anchored to a stretcher immediately in front of the fire-box throat plate. Here again side bolsters take the weight from the main frames.

The cab follows standard L.M.S.R. practice and has double sliding windows on each side, with a small glass screen between them that can be turned to act as a draught preventer when the enginemen are looking outside the cab. A hinged window giving an ample lookout area is fitted in the cab front plate. Tip-up seats are provided for the crew and there are gangway doors between the engine and tender. The various cab fittings are of the L.M.S.R. standard type. A sand gun is provided by means of which the tubes can be cleaned during a run, a point of importance on long journeys.

The tender is modified in shape from previous L.M.S.R. standards in order to match the streamlining of the engine and the shape of the coaches. The sides are not cut down beyond the rear division plate of the coal space, but are carried right back at their full height and are even extended beyond the rear of the tender tank, thus reducing externally the gap between the engine and train. The tender carries 4,000 gallons of water, but the coal capacity is now 10 tons. An innovation that the fireman will appreciate is a coal-pushing device actuated by a steam cylinder mounted on the back of the bunker or coal space, for this can be used to push the coal forward toward the end of a run and then will save considerable labour. Water pick-up apparatus of standard type is fitted, and there is also a deflector in front of the scoop to reduce excessive splashing and waste of water when picking up from the troughs.



A corner of one of the first-class compartments of "The Coronation Scot." There are only two seats on each side, so that each first-class passenger has a corner seat.

The trains these magnificent new locomotives will haul are worthy of them. Three new set trains have been constructed, and the first of these was shown at Crewe when "*Coronation*" left the erecting shop. All the coaches are finished in blue, with silver bands running horizontally between the windows, and exactly match the locomotive in finish. The silver bands on the sides of engine and train are at the same level, and the effect is very striking. When one of the new trains is travelling at high speed its appearance will be even more impressive, for it will form a long blue and silver streak flashing through the countryside.

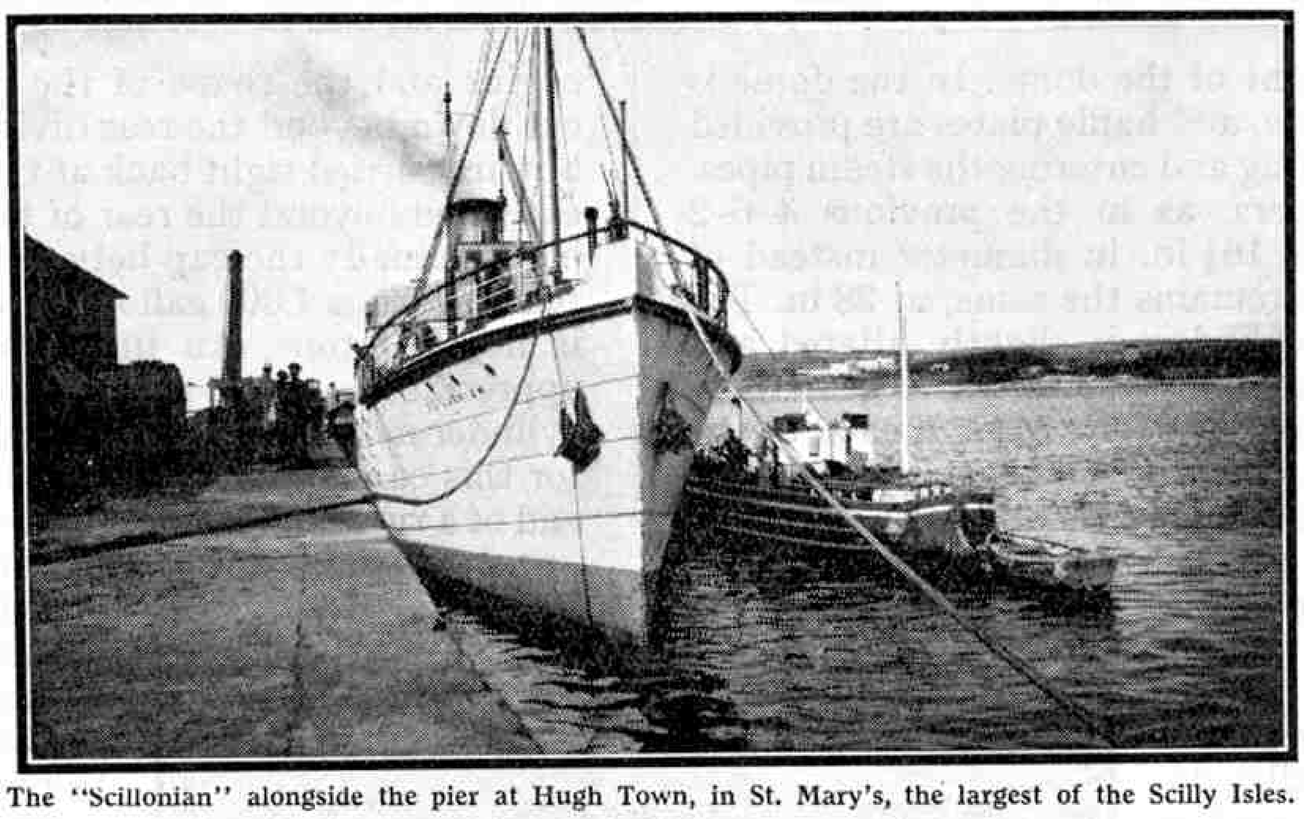
Each train consists of nine vehicles, accommodating altogether 82 first-class and 150 third-class passengers, the total weight being 286 tons. Two kitchen cars are included in the nine-coach formation to serve the single first-class and three third-class dining cars. The remaining vehicles are a corridor first-class coach and, at each end of the train, a brake-composite. The coaches are carried on steel underframes and the body sides, ends and roof are covered with steel panels finished flush with the windows. The coaches are not streamlined, but they have the smooth exterior finish that is characteristic of modern L.M.S.R. stock and this will help in keeping down resistance when travelling at high speeds. They run on bogies that have been specially selected.

A Trip to the Scilly Isles

Penzance to St. Mary's by R.M.S. *"Scillonian"*

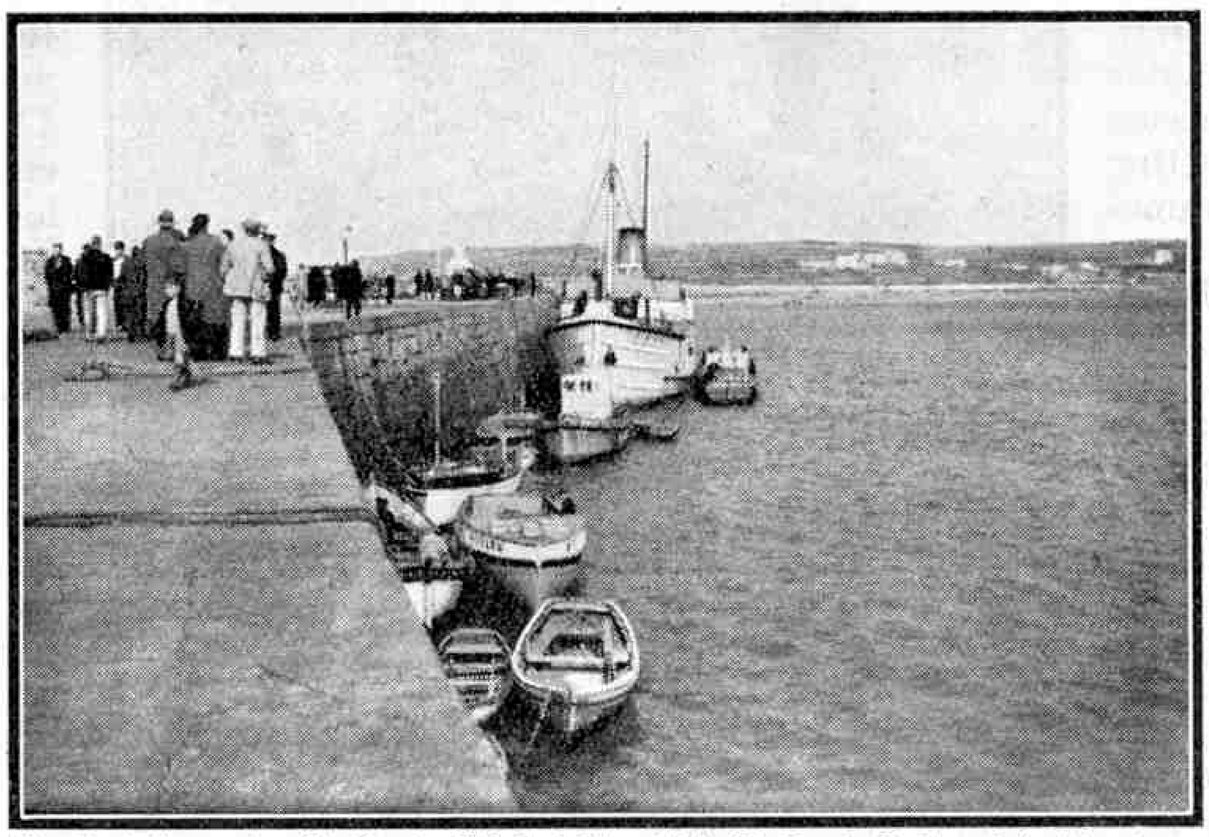
By O. S. Nock, B.Sc., D.I.C.

A VOYAGE to the Scilly Isles is about the nearest approach to going "right off the map" that it is possible to make in British waters. It is only on the clearest day that the islands can be seen from the mainland, and then only from the cliff tops near Land's End; more often they lie beyond a veil, obscured by even the lightest summer haze. But although the Scillonians form one of the most isolated communities in the British Isles, the out-of-the-world feeling is not nearly so pronounced as in some parts of Scotland or western Ireland. The Scilly Isles lie close to one of the greatest shipping routes in the world, and the regular passage of such giants as the *"Queen Mary"* and the *"Normandie"* bring a feeling of contact with affairs that is quite absent in the Hebrides. For the greater part of the year, too, the whole atmosphere of the islands is gay; entrancing displays of early spring flowers, the dazzling blues of sea and sky, and waterways alive with sailing yachts, motor boats and other craft dispel any suggestion of remoteness, or solitude.



The "Scillonian" alongside the pier at Hugh Town, in St. Mary's, the largest of the Scilly Isles.

On the day we sailed Penzance was in its most brilliant mood, with a moderate south-east wind and almost cloudless sky bringing midsummer colouring to a March seascape. Going down to the harbour quay there was a most delightful first glimpse of the *"Scillonian"*; she was berthed at the extreme end of the western jetty, just beneath the lighthouse, and framed in the harbour entrance lying across the water on the eastern side of the bay was St. Michael's Mount. The *"Scillonian"* is a very attractive little craft. With her white hull, vivid green below the Plimsoll line, she has more the appearance of a cruising yacht than a mail boat, but for all that she is a sturdily built maid-of-all-work well suited to wild seas. Her gross tonnage is only 430.



The Hugh Town pier, St. Mary's. This is built out into St. Mary's Pool, and stretches from the shore to a rocky islet in the bay.

It was low tide and the little ship was lying far below the level of the pier, but all the passengers were in holiday mood and the hazards of a gangway inclined at 45 degrees to the deck merely provided much laughter and an excellent starting fillip to the voyage. Just before noon came the "Stand by," and on the stroke of the hour we were under way. In a series of mighty heaves that steeply sloping gangway was dragged up on to the quay; then—"Slack away aft." At this precise moment a Penzance hotel porter was discovered on board, quite oblivious that the ship was moving! He made his escape, amid cheers, over a hastily improvised gangway from the navigating bridge. We edged cautiously away from the jetty and then steamed out slowly into the bay, stern first, before swinging round on to our true course.

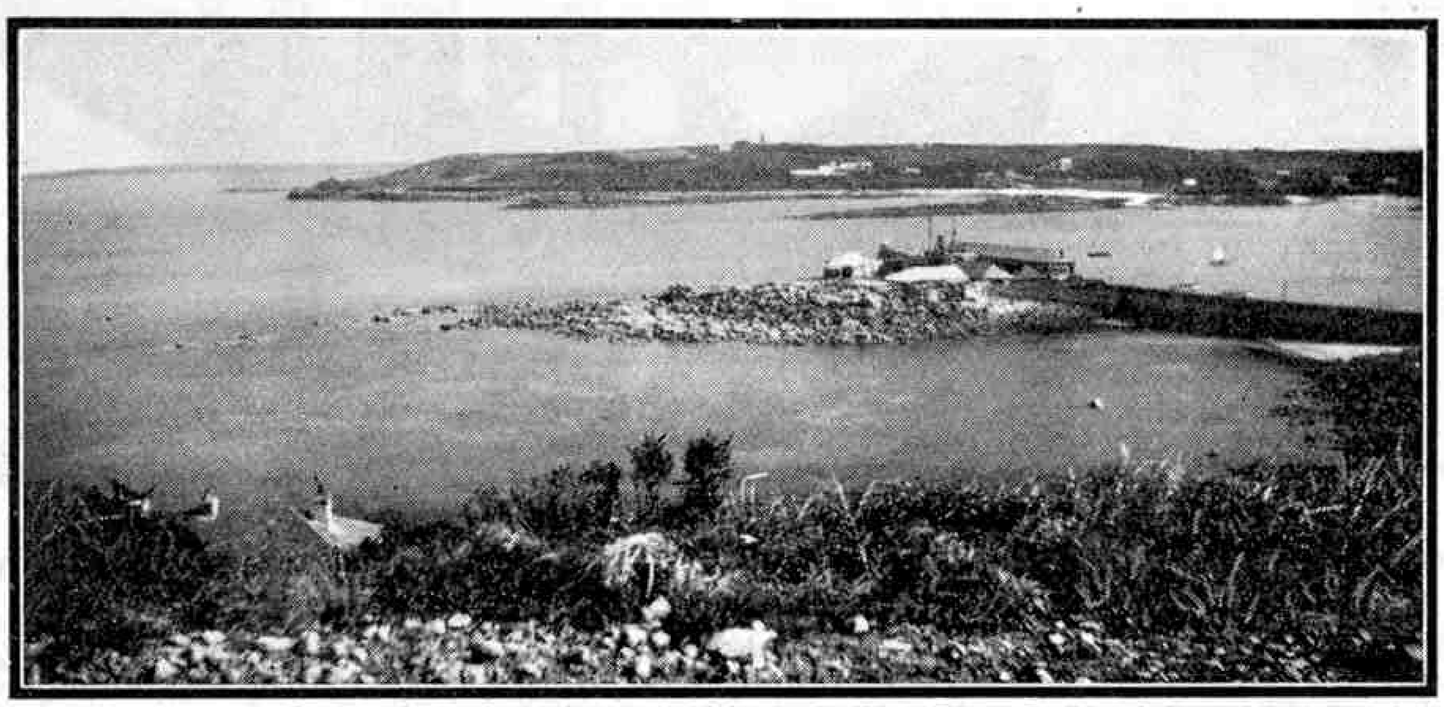
Mount's Bay looked superb. Penzance and Newlyn fairly sparkled in the sunshine; eastward every detail of the coastline could be picked out, from the pale gold sands of Marazion, right away past the black cliffs of Poldhu and Mullion to the Lizard, while the smoke of heather fires rose from the high purple moors behind Penzance where the ruined engine-house of Ding Dong Mine stands sentinel on the sky-line. In the midst of this exquisite scene, rising from waters of an amazing, almost Mediterranean blue, was the Mount itself, with sunshine gilding the castle walls and throwing into vivid light and shade the great rocks below. We were now making a course fairly close to the shore; soon the fishing village of Mousehole was abeam, and now my wife and I were privileged to join Captain Reseigh on the bridge.

Now we were entering on one of the most fascinating stages of the whole trip, the farewell to England. Nowhere else is departure so abrupt. Going out from Southampton or Liverpool the land gradually fades away; Dover cliffs are often still clear when one lands in France; but sailing beneath this mighty range of cliffs brought us to the very end of England. All along here the granite is of a unique yellowish grey. Boscawen Point, and Treryn Dinas with its towering pillars and its rocking stone, slipped by. Just beyond were Porthcurno's silvery-white sands, and then the coastline ended abruptly at Gwennap Head, which seen from the sea is one of the most impressive capes in Britain. Here the coast, which has been running roughly west-south-west, swings round almost due north and, watching from the steamer, Gwennap Head for some little time seems to be the very end of things. It is indeed a headland grander by far than Land's End. Then as we drew abeam, away to the north-west was revealed little by little a yet more striking scene. First there appeared the Longships lighthouse, built on a perilous group of rocks two miles west of Land's End; then a fierce array of granite pillared headlands, isolated rocks grotesque and majestic rising from the surf, and then at last a blunt nose of land jutting out a short way from the general line of the cliffs—the Land's End.

We passed just over a mile to the south of Gwennap Head, skirting the Runnel Stone, an isolated rock marked by a bell buoy; cross currents began to make themselves felt and the *"Scillonian"* was soon indulging in corkscrew-like antics. The sky had grown overcast immediately overhead, but this was only a fairly extensive local patch, and the brilliant blue out beyond caused an astonishingly beautiful limpid reflection on the sea. For some time the Wolf Rock lighthouse had been a prominent object on our port bow. It stands alone, six miles from the shore, and as no other pinnacles of the reef rise above the water, nothing but the lighthouse building is to be seen.

All eyes were soon looking ahead for a first glimpse of the islands. For some time I watched that brilliant horizon—surely something

should be showing up by now for we were less than 20 miles away—and then I realised that the islands were still below the curve of the earth's surface. There is not a hill in Scilly more than 160 ft. high, and the first appearance of the isles was singular in the extreme. First of all came a tiny streak, looking rather like a distant ship; this reared itself up into a little black hummock, and then a little to the left half a dozen dots slowly lengthened upward till it seemed as though a fleet of tall sailing ships was coming. Other dots appeared on the horizon, and the mast-like objects resolved themselves into the highest points of St. Mary's, the largest of the islands. In the meantime the Cornish coast was slowly receding



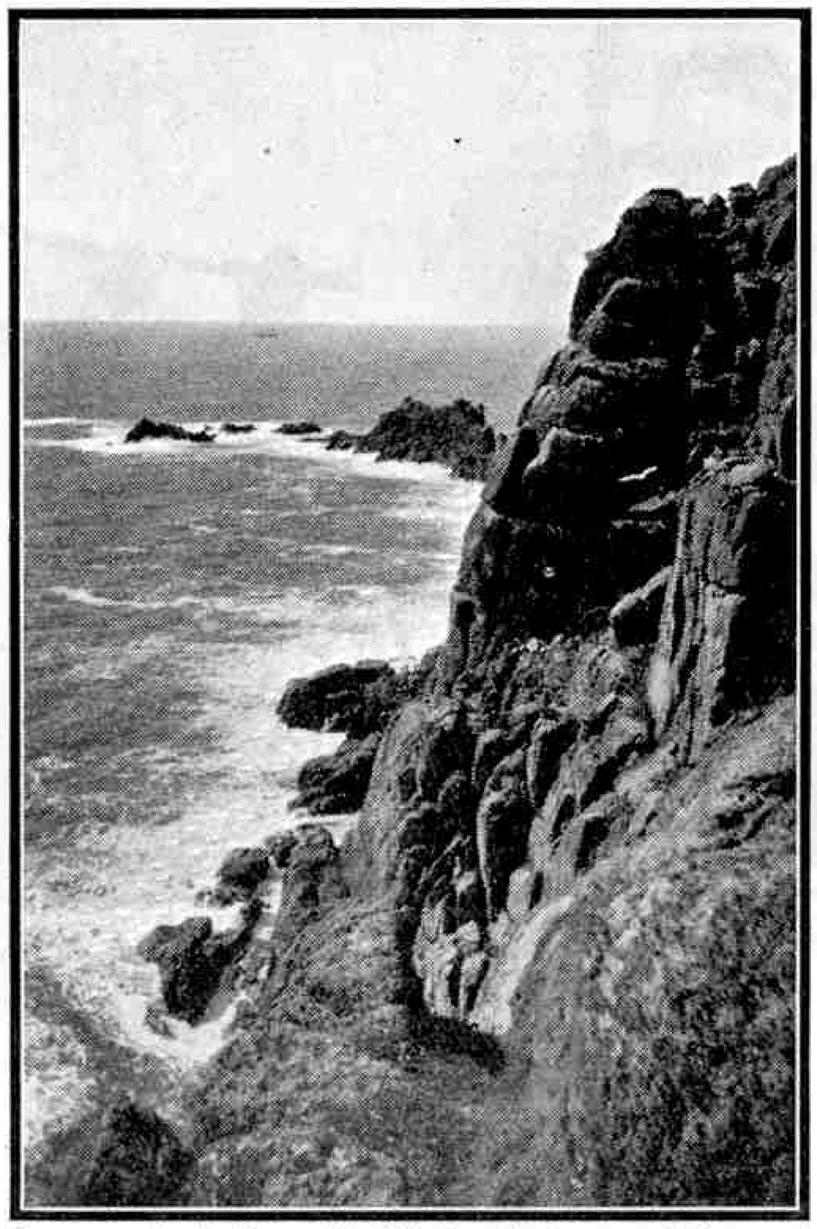
St. Mary's Pool, the bay on which stands Hugh Town, St. Mary's.

For half an hour we steamed on, making a steady 12½ knots. The little ship plunged and rolled; occasionally she gave a curious sideways wriggle. More and more dots were coming up over the horizon, but seen against the light even the larger land masses were still quite devoid of colour. Before long, however, we were sufficiently close for Captain Reseigh to point out one or two of the more prominent objects.

From the direction in which we were approaching the islands were seen divided into two archipelagos. St. Martin's, our first landfall, was the nearest of the northern group; to the south St. Mary's and St. Agnes were superimposed on one another; lying right athwart the channel that separates the two groups were the uninhabited eastern rocks. Now at last the land was beginning to show some colour. The red and white bands of the daymark on St. Martin's head shone in the sunshine, golden sands gleamed, and all the time the sea astern of us was of an almost unbelievable blue. Hugh Town, the largest settlement in Scilly, can be reached either by way of Crow Sound, which leads between the two groups of islands, or by going south of St. Mary's and entering the central roads by the western sound. The route followed depends on the state of the tides. To-day we were going in by Crow Sound.

The Eastern Isles consist of rugged masses of that same yellowish grey granite that looks so fine at Land's End, and as we passed them and steamed into the central channel the whole northern group of islands were spread out in a semi-circle of enchanting beauty. Right ahead lay the two blunted cones of Samson, there was just a glimpse of Bryher lying a little to the right, and then came Tresco, the most beautiful of all. Its low hills are clothed with dark woodlands and the sands are dazzling white.

By this time we were rounding the northernmost point of St. Mary's, St. Martin's lay on our starboard beam, and between this latter island and Tresco there is a very striking archipelago, all uninhabited. The three tremendous granite stacks of Men-a-Vaur, the cone of St. Helen's, and Round Island with its splendid lighthouse were seen one behind the other, a formidable array of rocks. The sea just off St. Martin's was a pale transparent blue of astonishing beauty, caused no doubt by the white sand just beneath the water.



Gwennap Head, Cornwall. This headland, one of the most impressive in Great Britain, is passed on the way to the Scilly Isles from Penzance.

As we steamed past the Crow Rock, Hugh Town was revealed lying round the shores of St. Mary's Pool, and the open Atlantic ahead was dotted with myriads of black rocks stretching right out to the Bishop Rock lighthouse, one of the most important beacons for Transatlantic shipping. As we approached the pool, Captain Reseigh blew a long blast on the siren, evidently to give ample warning of our approach. The arrival of the *"Scillonian"* is much the most important event of the day, and a large proportion of the community usually foregathers on the pier to welcome her. We berthed at 3.15 p.m.

On the outward journey the passing scene was of such interest that I gave no thought to the machinery of the *"Scillonian,"* but when returning home a few days later I was privileged to go round the engine-rooms of this splendid little ship. But before going below I must describe the start of the voyage, as this time we took the second of the alternative routes from Hugh Town quay. It was an even more brilliant day than on the outward passage, with a stiff east wind sweeping straight down from the English Channel. We got away at 2 p.m., and after manœuvring off the pier made off in a direction at first almost due west. Soon the western isles were displayed in all their unique beauty. On our starboard beam as we turned southward round the western end of St. Mary's there lay Annet, home of myriads of sea birds; The Haycocks, a row of wicked-looking pinnacles rather like a granite edition of The Needles; and the long flat ridge of St. Agnes with its lighthouse and a cluster of cottages.

By this time the *"Scillonian"* was rearing and plunging like a live thing. We passed the bold granite stacks of Peninnis Head, and soon the islands were slipping away behind. This was a good opportunity for a look round the engine-rooms. The *"Scillonian"* is driven by a triple-expansion reciprocating steam engine, having one high-pressure, one medium, and one low-pressure cylinder; reversing is effected by Stephenson's link motion, and the layout is in many ways similar to that of the *"Lady Leinster,"* which I described in the September 1936 issue of the *"M.M."* The *"Scillonian"* has only a single screw, and thus all three cylinders drive on to one shaft. The propeller speed is quite low, only 132 r.p.m. Steam is supplied at 180 lb. per sq. in. from one Scotch marine boiler, which is hand fired with coal. The *"Scillonian"* must be an economical little ship, for only one stoker at a time is needed to attend to all three furnaces. One stoker is relieved by another on passing the Wolf Rock.

When I came up to the bridge again the Wolf Rock lighthouse lay on our starboard bow, a very distant object as yet, and it was some little time before we got a first sight of the Cornish coast. A slight haze hung over the eastern horizon and at this range the cliffs were veiled. Slowly there developed a white patch, which gradually resolved itself into the big hotel at Land's End. The cliffs emerged as a long golden-yellow rampart, the china clay dumps loomed up behind, but although the Longships Lighthouse now showed up as a slender white column there was only the merest hint of the purple-brown moors that lie back from the sea. Journey's end brought with it scenes of exquisite beauty —great waves breaking over the base of the Wolf Rock lighthouse; Gwennap's mighty cliffs warm and friendly as we drew near, but changing as we passed to a profile of the most savage grandeur; the Lizard coastline looming out of the haze; then, looking against the light, four great headlands silhouetted one upon the other, the depth of shade lessening as distance increased. In the shelter of the Monschole cliffs the *"Scillonian"* was now gliding along smoothly, and a glimpse of one of those characteristically Cornish church towers, tall and secure, peeping over the hilltops, ushered us on to the last scene of all, Mount's Bay, calm and serene in the evening sun. So, at a little before half-past five, we berthed at Penzance.



Railway Air Services Progress

Last year the mileage operated by the aircraft of Railway Air Services was 905,597 flying miles, which was greater than the corresponding totals of 1934 and 1935 combined. Longer-range aircraft, better radio facilities, and the increasing experience of the pilots and of the organisation generally have been chiefly responsible for the greater traffic handled by the company. The cancellation of services owing to adverse weather has been reduced to a very low figure, and on the London-Belfast-Glasgow route only 3.9 per cent. of the scheduled stages were cancelled for this reason, chiefly during January and February.

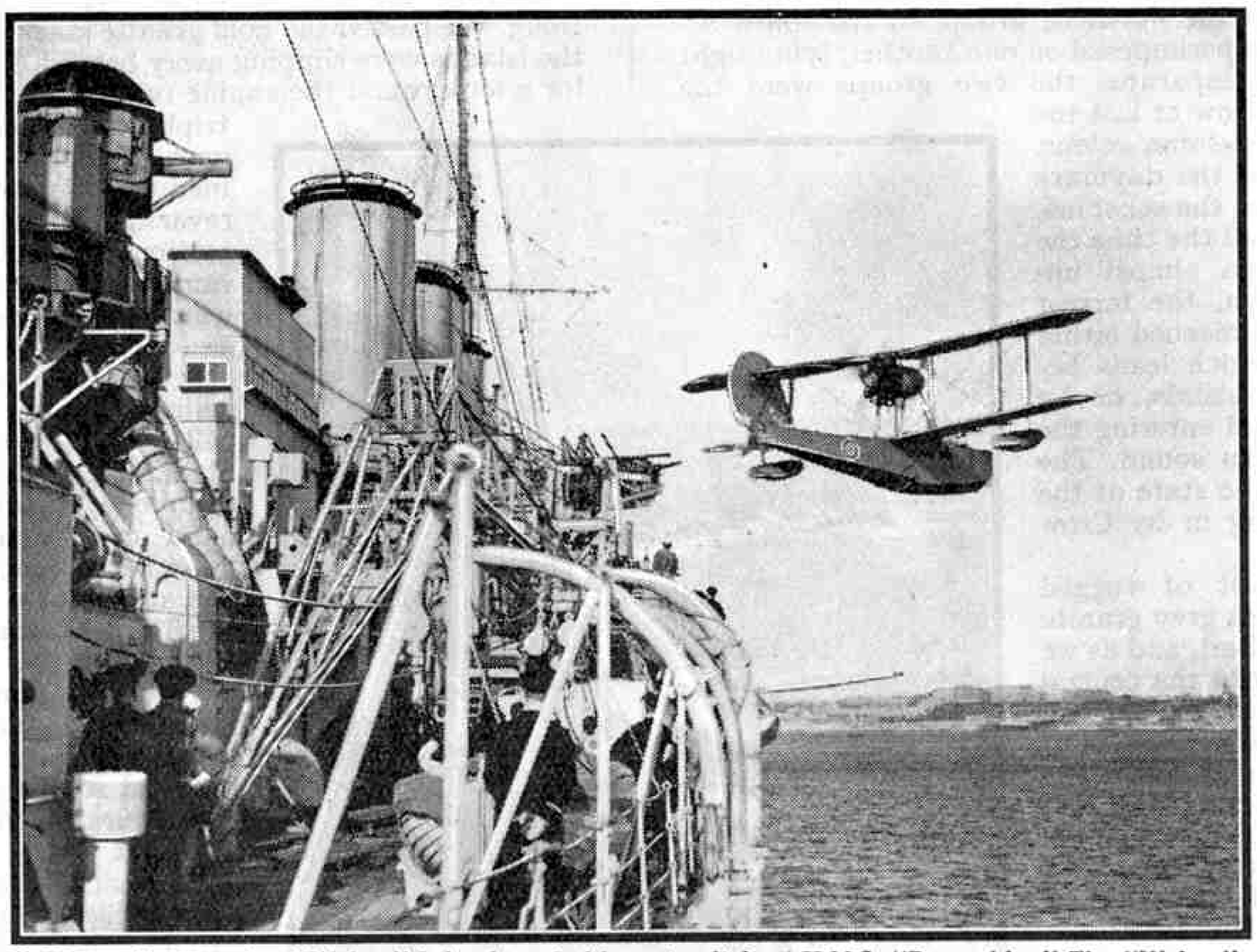
The 1937 summer programme introduced on 10th May includes an additional afternoon trip in each direction on the London-Belfast-Glasgow route. This new service enables inward services to the north to connect with air services from the Continent, and makes it possible for passengers to travel from Basel, Berlin, Copenhagen, Marseilles or Milan to Belfast or Glasgow between breakfast and dinner.

There are now three services daily in each direction between Belfast and Glasgow. It is calculated that 100,000 more aircraft miles will be flown this year than in 1936, and the summer timetable enables business men to leave London after breakfast, spend four hours in Belfast, and be back in London in time for dinner.

More American Aircraft for Air France

Air France continue to add to their already extensive fleet of aircraft, and their latest order is for 20 Bellanca high speed monoplanes of a new type, for use on the company's internal air routes. They will be twin-engined machines with 250 h.p. Pratt and Whitney "Twin Wasp" engines, and recent test flights have given rise to the claim that the monoplanes will be the fastest commercial aircraft in the world.

Some of the Dewoitine 338 triple-engined monoplanes acquired last year are to be sent to South America. These large passenger and freight air liners will be employed on the long-distance air service linking Natal, in Brazil, with Pernambuco, Rio de Janeiro, Buenos Aires, and Santiago in Chile. The aircraft at present operating this Air France service only carry freight, and the Dewoitine machines will enable passengers who have flown across the Atlantic by the Air France route to continue by air across South America to the Pacific coast. Dewoitine 338 air liners are already operating over the Toulouse-Dakar section, and Loire-et-Olivier H-47 flying boats now under construction are to be used for the ocean crossing from Dakar to Natal.



A Vickers Supermarine "Walrus" being launched by catapult from H.M.S. "Devonshire." The "Walrus" is the first amphibian type of aircraft to be catapulted from a warship of the British Navy. Photograph reproduced by courtesy of Vickers (Aviation) Ltd.

More Zeppelins

The tragic loss of the *"Hindenburg"* has made the construction of the new airship LZ.130 very urgent, and it is expected that she will be completed by the autumn. Two other airships, which will be known respectively as the LZ.131 and LZ.132, will then be laid down. They will be similar in size to the LZ.130, but will be designed to accommodate a greater number of passengers.

Two Altitude Records Won for Italy

Italy has regained the aeroplane height record wrested from her last year when Sq. Ldr. Swain, flying the first Bristol 138a monoplane, reached a height of 49,967 ft. The new record has been set up by Lt.-Col. Mario Pezzi, Chief of the High Flying School of the Regia Aeronautica. In a Caproni 161 biplane he reached a height of 51,348 ft., or 1,381 ft. higher than Sq. Ldr. Swain. The Italian pilot was clad in a special suit, and this and the glass window of his helmet were electrically warmed.

The record is likely to remain in Italian hands until the second Bristol monoplane is ready. This aeroplane will be fitted with a liquid-cooled Rolls-Royce engine, and is confidently expected to be able to reach a new record height.

The international height record for seaplanes carrying a load of 10 tons also was won recently by Italy, when Mario Stoppani reached a height of 15,955 ft. in a triple-engined Cant Z.508 flying boat, carrying a load of 10 tons. The previous record was set up in December of last year by the Russian airmen Riabelik and Illinski, who flew an A.N.T. six-engined seaplane loaded as required, and reached a height of 6,372 ft. This figure has been almost trebled by the Italian achievement.

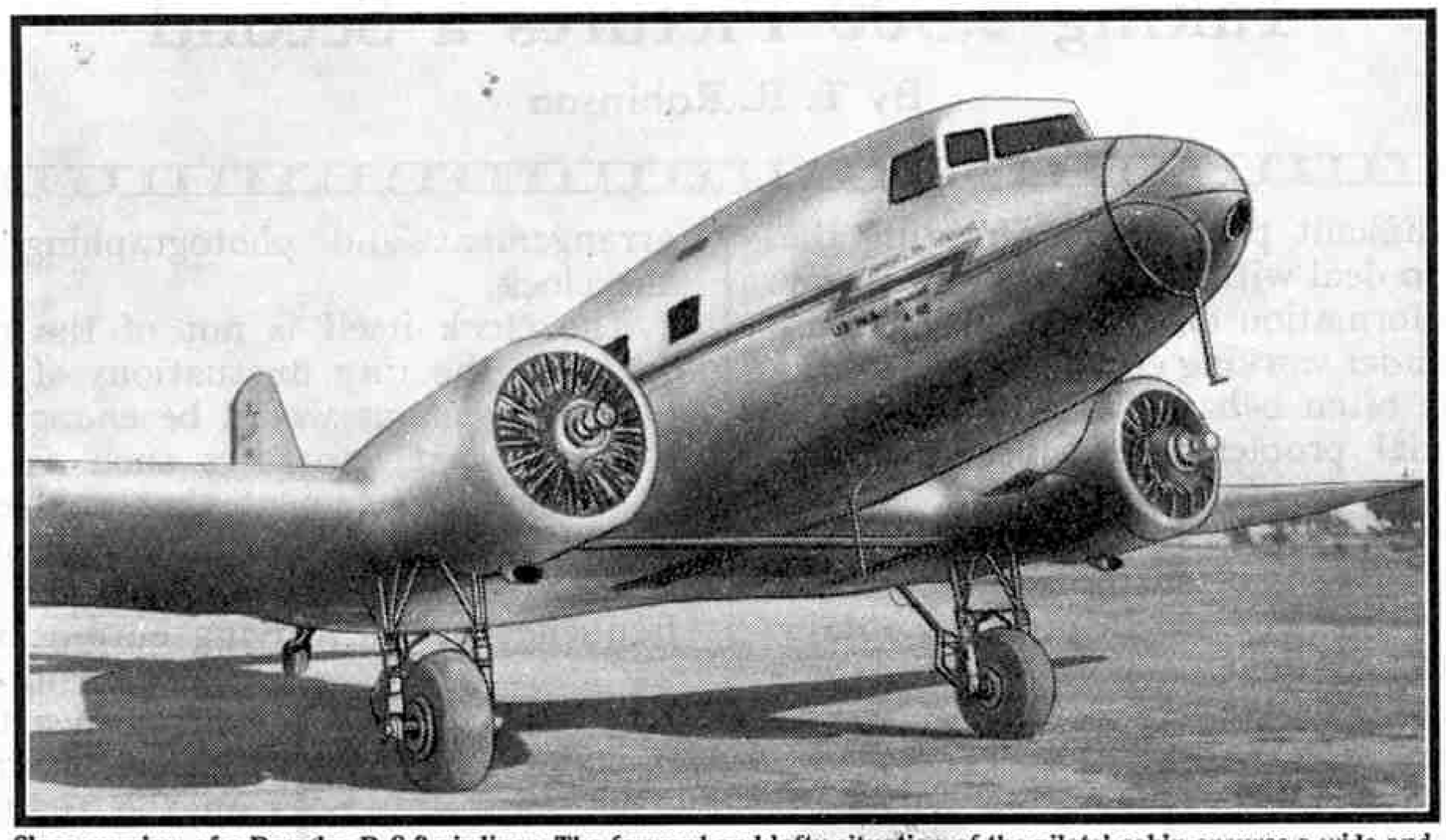
Egypt to England in a Day

The Imperial Airways flying boat *"Cassiopeia"* has created a new Empire record by flying from Egypt to England, with a crew of five and 14 passengers, and 1½-tons of mail and freight, in 18 hrs. This is the first time that a passenger flight has been made between the two countries in one day. *"Cassiopeia"* took off from Alexandria in the early morning and, after making scheduled calls along the Empire air route, ended her long trip at the marine air base at Southampton.

The flying boats are powered by four Bristol "Pegasus" engines, each of which develops 920 b.h.p. at the take-off.

Douglas D.C.3 Air Liner

The upper illustration on this page shows a Douglas D.C.3 air liner. This aeroplane is an enlarged version of the D.C.2, which was described and illustrated in the September 1935 *"M.M."* It is 95 ft. in span, 65 ft. in length, and 16 ft. 4 in. in height. The long passenger cabin is divided into eight compartments, four on each side of a central gangway, and each compartment has two facing seats. The air liner can be used as a sleeper during night flying. In each compartment the seats are then adjusted so that they form the lower of two berths, and an upper berth is lowered into position from the ceiling. Each berth is provided with a clothes net, bell, and reading light. The D.C.3 might almost be described as an aerial hotel, as there are dressing and toilet rooms, and a fully-equipped pantry, in addition to mail and baggage compartments.



Close-up view of a Douglas D.C.3 air liner. The forward and lofty situation of the pilots' cabin ensures a wide and unobstructed outlook. Photograph by courtesy of N.V. Nederlandsche Vlietuigenfabriek, Amsterdam.

The two Wright "Cyclone" supercharged engines employed are more powerful than those fitted in the D.C.2, and give the machine the slightly higher speed of 212 m.p.h. The improvements that really matter, however, are that the D.C.3 is capable of carrying one-and-a-half times as many passengers and one-and-a-half times as much useful load as the D.C.2, although the fuel consumption of the two aeroplanes, flying at the same cruising speed, is practically equal.

The Douglas air liners are produced in America by the Douglas Aircraft Company, Inc., and in Europe are made under licence by the well-known Fokker Company, of Amsterdam.

Civil Aviation in Russia

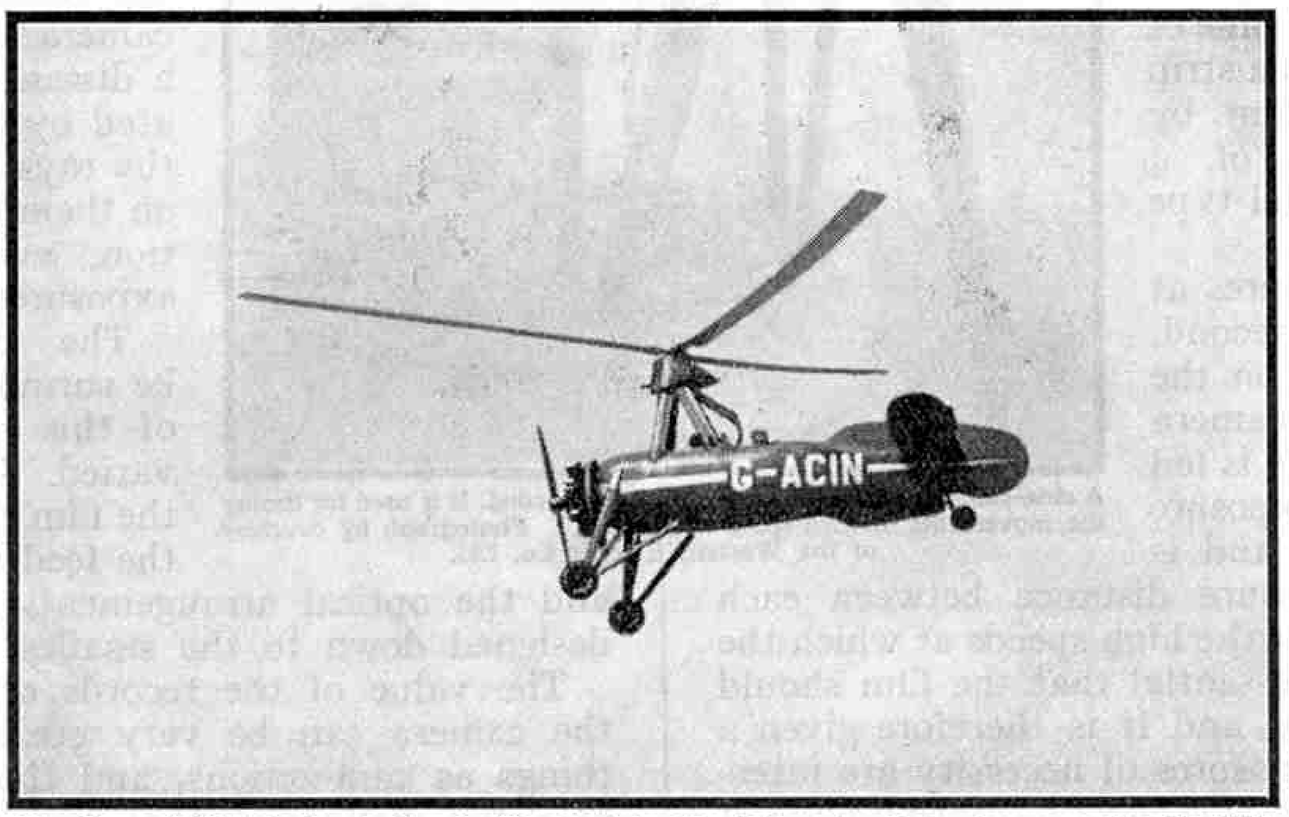
Further information now available concerning the development of commercial air services in Soviet Russia includes some remarkable instances of the great saving in time that is effected by the use of aeroplanes. The value of air transport is shown particularly in Siberia, where aeroplanes are employed regularly in establishing communication between remote settlements and the nearest centres of supply. For instance, a trip from Irkutsk to Yakutsk, which may take about a month by sleigh, can be effected by air in only two or three days in the summer and in three or four days in the winter.

The latest instance of Russian interest in air transport to and from the Polar regions is the despatch of a scientific expedition by air to the North Pole. The expedition is led by Professor Otto Schmidt, and includes a radio operator and four scientists. A safe landing was effected on an ice-floe 12½ miles from the North Pole, and a settlement established there, as the members of the expedition are to remain for a year. The necessary food supplies and scientific instruments were then flown to the settlement from a base established on Prince Rudolf Island, where there is a radio station that will enable the party to keep in touch with civilisation.

The aerial equipment of the expedition consists of one twin-engined A.N.T.7 air liner and four 4-engined A.N.T.6 machines. It is understood that the station established at the North Pole will form a link in an air service planned to operate between Moscow and San Francisco.

Civil Aircraft in England

The latest report of the Air Registration Board shows that the total number of aeroplanes registered in this country up to 15th April last, was 1,755. Only 54 of this number are foreign machines, and 74 of the remainder are owned by Imperial Airways. A total of 4,621 civil aircraft are owned by training schools, air taxi operators and joy-riding concerns, and civil flying clubs possess a total of 194 British and seven foreign aircraft. The number of privately-owned aircraft registered up to 15th April, was 687, of which 35 are owned by women pilots, and 33 are foreign machines.



The Cierva C.30 Autogiro in the air. The great length of the rotor blades is very noticeable. This machine takes-off after a forward run of only a few yards, and can alight without a run. Photograph by courtesy of Cierva Autogiro Company Ltd.

Bermuda-New York Air Mail Service

On May 25th two successful survey flights were made, one in each direction, over the 770-miles Bermuda–New York air mail route, as a preliminary to the establishment of a regular air-mail service. The flight from Bermuda to New York was made by the Imperial Airways flying boat *"Cavalier,"* in perfect weather conditions and in a flying time of 5 hr. 55 min. During the flight *"Cavalier"* was in wireless touch with land stations, and also with the *"Bermuda Clipper,"* of Pan-American Airways, which was making the flight at the same time but in the reverse direction. The two flying boats exchanged weather reports and other routine signals. Imperial Airways' radio operators in London were able to follow by short-wave radio the start and progress of the flight of the company's machine.

Flight-Clerks for "E" Class Air Liners

The crews of the Imperial Airways "E" class air liners will include Flight-clerks, as in the case of the Empire flying boats. The duties of the Flight-clerk are, broadly speaking, similar to those of the Purser in an ocean liner. He is in charge of the machine's papers, and deals with all documents and waybills connected with mails and cargo. The Flight-clerk also conveys information from Captain to passengers, and he gives the latter interesting details as to the speed of the air liner and other relative matters, and points out landmarks along the route. When the air liner makes one of its scheduled landings, it is the duty of the Flight-clerk to have all necessary documents ready to hand, so that Customs and other formalities can be completed as quickly as possible.

U.S.A.–New Zealand Flying Boat Service

Pan-American Airways plan to inaugurate a regular flying boat service between San Francisco and Auckland, New Zealand. When this service is in operation it will be possible for mails to be transported from this country to New Zealand in 10 days. The mails will, pending the introduction of a North Atlantic air service, be carried across the ocean by ship, which at present takes about 4½ days, and will then be flown across the United States in one day, or night. At San Francisco they will be transferred to a flying boat, and about four days later will be landed at Auckland. At present mails cross the Pacific Ocean by ship to New Zealand, and the voyage takes about 19 days. The company are negotiating with the New Zealand Government regarding the proposed service.

A High-Speed Cine-Camera

Taking 2,500 Pictures a Second

By T. R. Robinson

ONE of the most difficult problems confronting the engineer who has to deal with high-speed machinery is that of obtaining information on the actual performance of the machines under working conditions. At really high speeds a machine often behaves in a manner that introduces many special problems, and yet the very speed itself is a barrier to the study of these.

The high-speed cinematograph camera is of assistance in such cases, but even this is often too slow to follow every movement of the mechanism. In order to obtain such records, and to combine them with a time record on the same film, the Western Electric Co. Ltd. therefore have introduced a special timing camera that takes pictures on standard cinematograph film at the astonishing speed of 2,500 exposures per second.

With such an instrument as this the engineer can analyse the details of operation of rapid automatic machinery, study the flow of air over streamlined sections, and obtain accurate information on many other useful points. The picture of the subject photographed occupies most of the exposure area, and the time of the exposure is recorded on a strip along the edge of the film by photographing the dial of a synchronous clock of special type built into the camera base.

In order to make exposures at such a rate as 2,500 per second, it was necessary to abandon the usual method of cine-camera operation, in which the film is fed through the "gate" or exposure point picture by picture, and is moved forward one exposure distance between each operation of the shutter. At the high speeds at which the camera has to work it is essential that the film should move forward continuously, and it is therefore given a steady movement. The exposures of necessity are intermittent, and in order to give this effect a rotating plate of glass, known as a scanner-plate, is interposed between the lens and the film. This plate rotates 180 deg. for each exposure, and the light passes through it during the middle 80 deg. of its rotation. This gives an exposure time for one picture of 45 per cent. of the complete cycle, which is enough for a clear picture and yet allows time for the film to move forward so that the next part is brought into position for the following exposures.

Two scanner-plates are in use, one working in conjunction with the main lens, and the other, a smaller one, operating in connection with a second lens arrangement and photographing the timing dial of the clock.

The clock itself is not of the mains-operated type, for even the tiny fluctuations of frequency that occur on supply mains would be enough to upset the timing of really fast exposures such as these. The dial has a vernier arrangement that enables intervals as small as .001 sec. to be read, and a tuning fork of a special type, vibrating at 200 cycles per second, controls the frequency of the driving current with an accuracy of one part in 20,000. This fork is placed in a thermostatically controlled housing in the case shown on the right in the photograph of the camera reproduced on this page. The case contains also an amplifier for the current from the generator, and after amplification this current is used to operate the motor of the synchronous clock in the camera.



A cine-camera that takes 2,500 pictures a second. It is used for timing the movements of high-speed machinery. Photograph by courtesy of the Western Electric Co. Ltd.

The camera motor is kept running continuously, but the dials can be started and stopped by means of a magnetic clutch actuated by the discharge of a condenser. This system allows the control to be placed on the camera or, if more suitable, at a distance. The dials are illuminated by two small electric lamps, the rays from which are focussed on them and give ample illumination, even for the very short exposures necessary in this work.

The problems that had to be surmounted in the production of this camera were many and varied. The gate through which the film runs while being exposed, the feed and take-up mechanism, and the optical arrangements all had to be carefully designed down to the smallest detail.

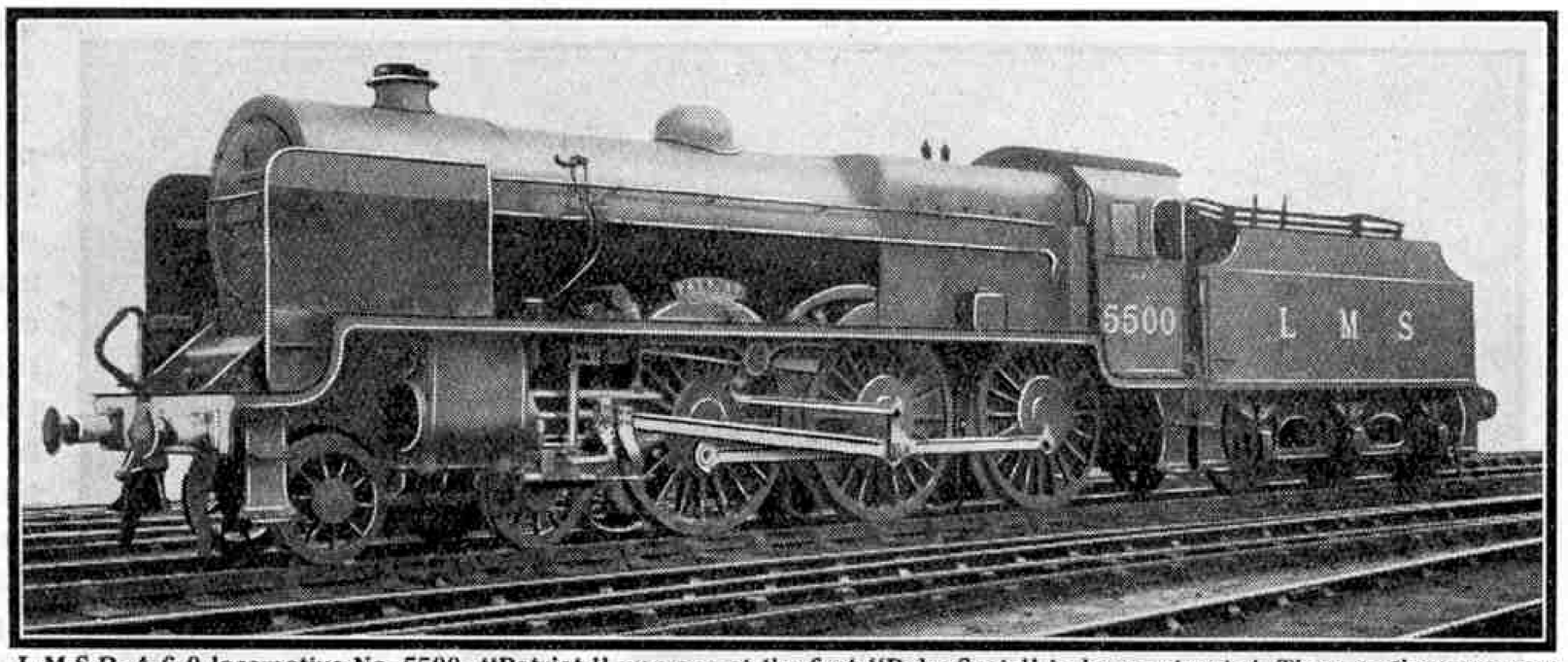
The value of the records obtained with the aid of the camera can be very great in the study of such things as cam-actions, and the strange and often unexpected distortions that may occur in swiftly-moving mechanisms. These distortions often last for too short a time for detection by any ordinary means, but nevertheless may give rise to many troubles.

The camera has already been used to show in detail the recoil action of guns and the timing of foot and aeroplane races. Another application is the preparation of data on the acceleration curves of electric motors, for which the camera gives more complete information than could be obtained by other means. The film is projected at normal speed, thus slowing the action to one-hundredth of the true rate.

L.M.S.R. "*Patriot*" Locomotive

A Famous Name Revived

THE announcement made some time ago by the L.M.S.R., and duly reported in the "*M.M.*" of November 1936, that the name "*Patriot*" was to be given to engine No. 5500 must have given great satisfaction to many thousands of former L.N.W.R. railwaymen, and to those who were staunch supporters of the former "Premier Line." It meant that the honoured name of one of the best-known engines of post-War days was to be preserved, although the engine originally carrying it, one of the now obsolete L.N.W.R. "Claughtons," had been withdrawn. The new "*Patriot*" has been duly named, and we are now able to illustrate the engine and to include a close-up view of its special nameplate.

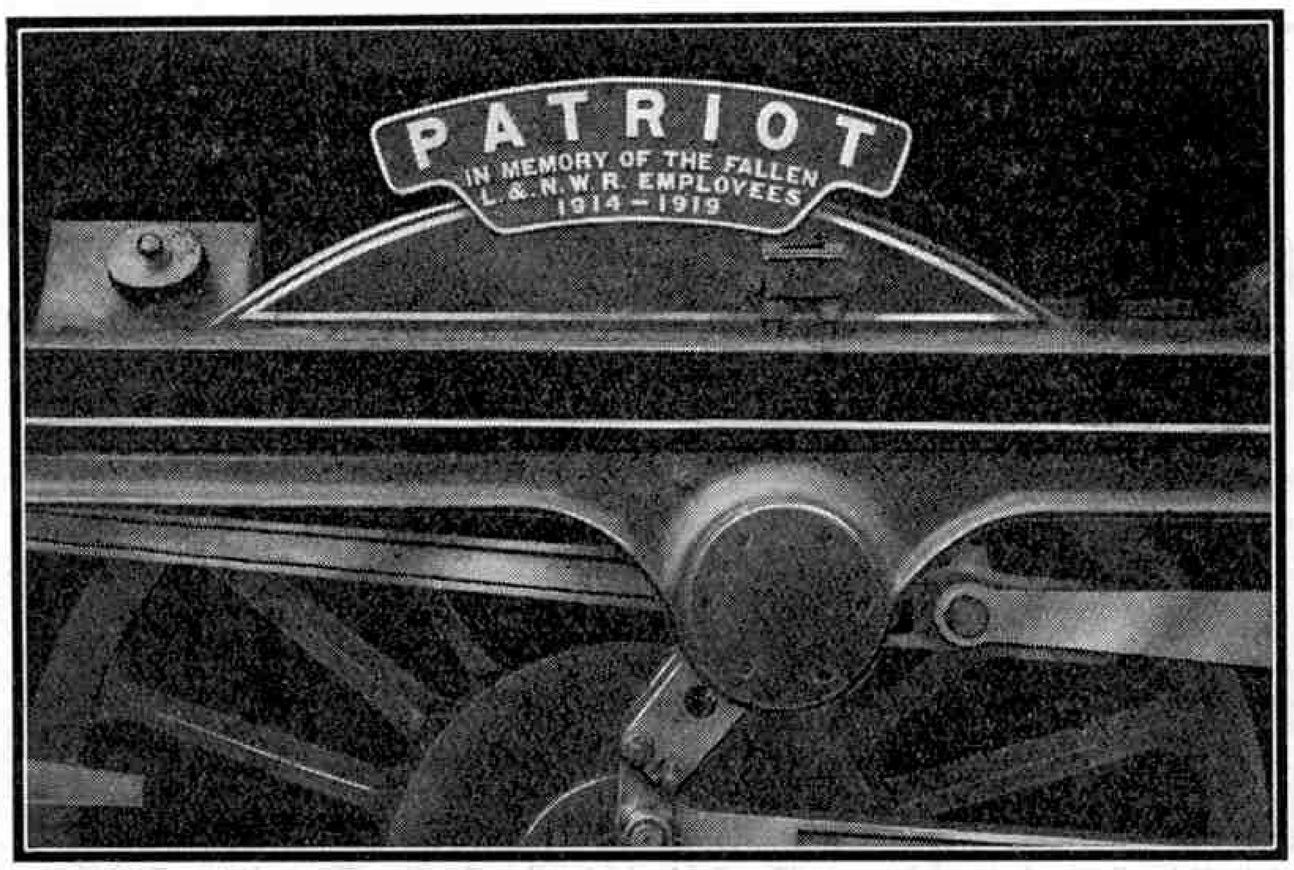


L.M.S.R. 4-6-0 locomotive No. 5500, "Patriot," was one of the first "Baby Scots" to be constructed. These engines are now known officially as the "Patriot" class. The photographs on this page are by courtesy of the L.M.S.R.

Older readers of the "*M.M.*" will know the circumstances surrounding the naming of the original "*Patriot,*" as the nameplate stated, "*In memory of the fallen L. & N.W.R. employees 1914-1919.*" For the benefit of a younger generation, however, who do not remember those troubled days of 20 years or so ago, it will be interesting to recall the connection of this engine with the European War.

During that great struggle an unobtrusive but very important part was played by British railways and railwaymen. Not only were railwaymen to be found on every battle front as actual combatants, but they were engaged also in the very necessary work of transportation, so vital to an army, for which their peace-time occupation rendered them particularly suitable. Those who remained at home were really "on active service," for in providing for the movement of men and materials, and in the maintenance of necessary transport, the railwaymen "on the Home Front" did yeoman service.

On the L.N.W.R., a line on which the mass production of locomotives as then understood had long been practiced at Crewe Works, a batch of the largest express engines so far developed on the system was laid down in 1920. These engines were of the four-cylinder 4–6–0 "Claughton" class, the first of which had been turned out of Crewe in 1913. It was decided that one of these should bear the name "*Patriot,*" and thus form a travelling memorial to the men in the Company's service who had made the supreme sacrifice. Large nameplates were prepared bearing the name and the inscription shown in the lower illustration on this page, and the special number 1914 was allotted to the engine. The black livery of L.N.W.R. engines of course needed no amendment, and to complete the sombre effect the standard lining and even the red background of the number plate were omitted.



The special nameplate fitted to L.M.S.R. engine No. 5500. This plate is smaller than that carried by the L.N.W.R. engine of the same name, but has on it the same wording.

When the L.N.W.R. became part of the L.M.S.R. system, Midland red was adopted as the passenger engine livery, and in due course "*Patriot*" was so finished and re-numbered 5964 in the L.M.S.R. list. With the adoption of more powerful and efficient standard locomotives, the original "Claughton" class were eventually put on the condemned list and "*Patriot*" disappeared with them.

There had arisen from the bones of some of the "Claughtons" the very successful three-cylinder 4–6–0s known as the "Baby Scots," from their resemblance to the famous "*Royal Scot*" design. These engines bore the numbers and in some cases the names of the "Claughtons" that they replaced. In the L.M.S.R. renumbering scheme of 1934 the "ex-Claughton" numbers disappeared and the "Baby Scots" then in existence became Nos. 5500–5541. The last 10 engines of the series with parallel boilers, built just before the development of the similar but tapered-boiler class now known as the "Jubilees," were Nos. 5542–5551 from the beginning, the "Jubilees" following from No. 5552–5742.

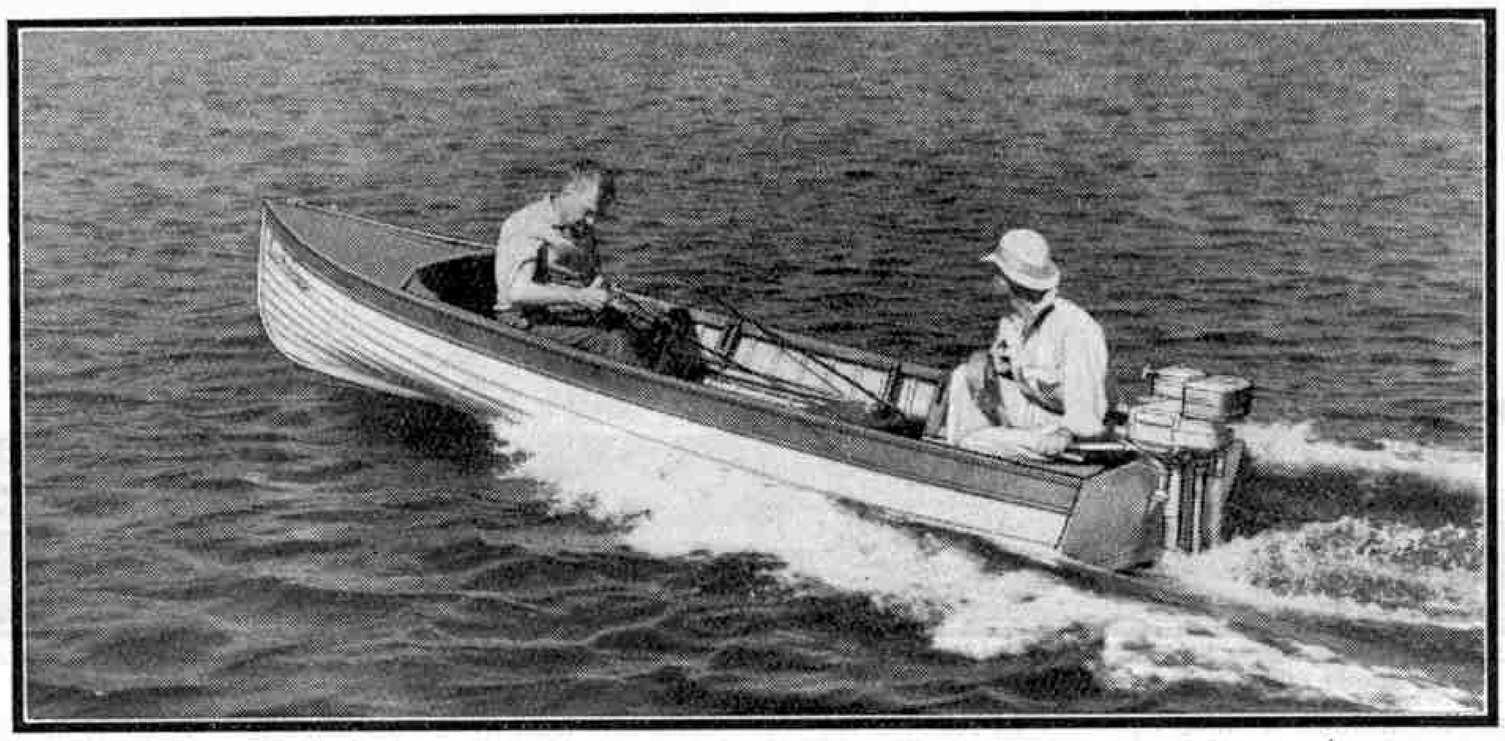
With the completion of the "regimental" naming of their bigger brothers, the "Royal Scots," the latest phase of L.M.S.R. locomotive practice sees the transference to the "Baby Scots" of several of the names of historic locomotives previously carried by the bigger engines. In addition there is the preservation of traditional L.N.W.R. engine names both in the "Jubilee" and the "Baby Scot" series. So now the first engine of the latter class, No. 5500, has become "*Patriot*" and thus carries on a very famous title in locomotive history.

The design of the new "*Patriot*" has prevented the use of the original nameplates which were made to go on the long straight-topped "Claughton" splashers. So new nameplates have been made to fit the small curved splashers of the present-day engine. Although there has been a change in form both in engine and in nameplates, the same spirit of remembrance has inspired the choice of name as in 1920, when the first "*Patriot*" was built. In addition, the use of the name of No. 5500 to distinguish its sister engines as a class means that the 52 "Patriots" will assist in preserving the memory of the L.N.W.R. men who "did their bit" during the years 1914–1919. War memories also are revived by the names carried by other engines of the "Patriot" series. Thus, as recorded in the "*M.M.*", No. 5501, formerly "*Sir Frank Ree,*" is now "*St. Dunstan's,*" and No. 5502 is "*Royal Naval Division.*"

Outboard Motor Boating

Ideal Engines for Pleasure Craft

ABOUT thirty years ago an American named Ole Evinrude invented a detachable engine for motor boats. This was the forerunner of the present day outboard motors, which differ little in their main characteristics from the original Evinrude model. It is only fair to add, however, that prior to the experiments in America efforts were made on the Continent to develop the same idea, but these endeavours did not prove successful.



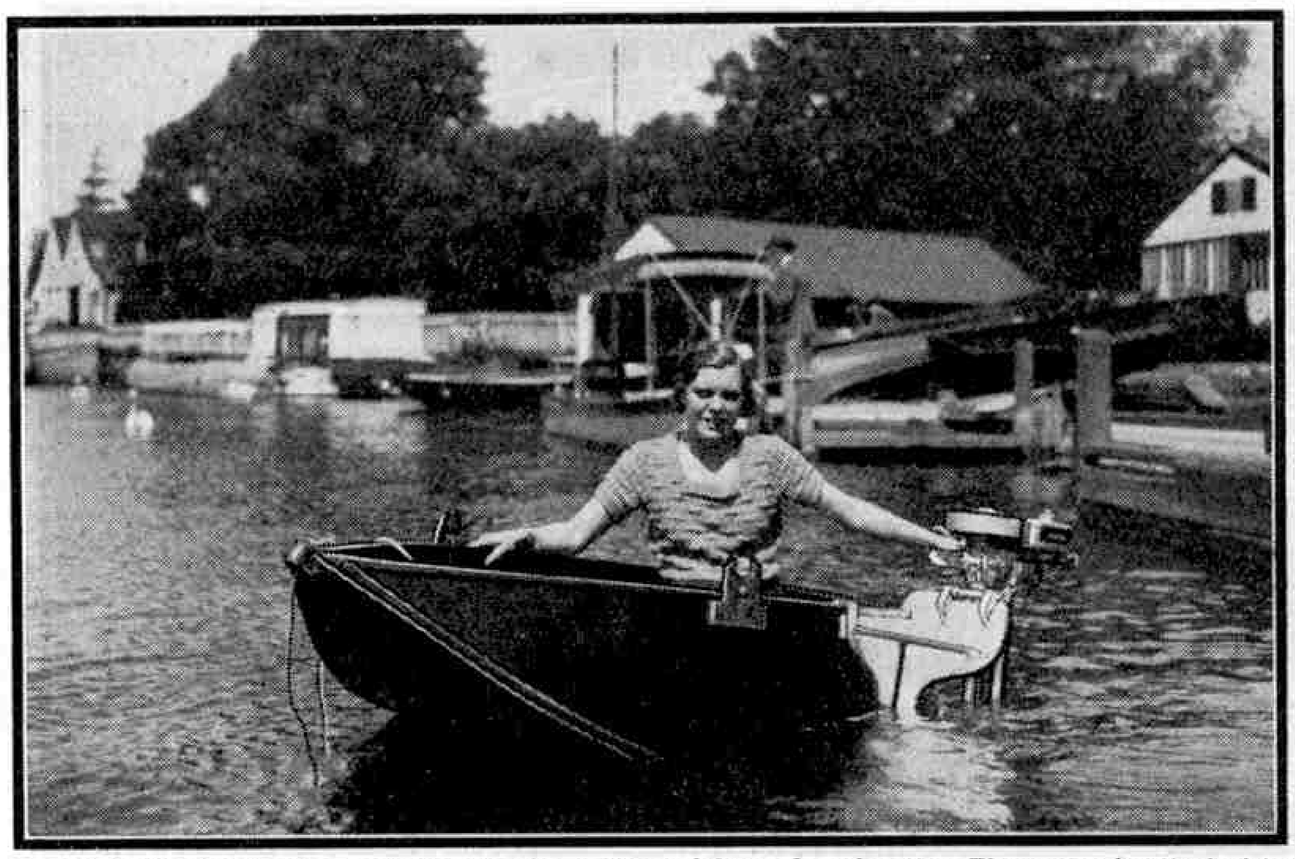
Outboard motors are very useful to fishermen. This illustration and the upper one on the opposite page are reproduced by courtesy of the British Motor Boat Manufacturing Co. Ltd.

For the benefit of those to whom the term "outboard motor" is new, it should be explained that a self-contained and portable marine unit is implied. There is an engine of course, having one, two or four cylinders, a driving shaft, propeller, water circulating pump and steering arrangements. The last named is particularly important, for when an outboard motor is attached to a rowing boat or other small craft it generally takes the place of the rudder and the boat is steered by turning the propeller, not on its own axis, but in a horizontal plane either to the right or left. By this means the thrust is not directly ahead, but to one side or the other and according to the extent that the tiller, which is an integral part of the outfit, is moved.

Present-day outboard motors range, in various models, from 1 h.p. to about 50 h.p. Those who are used to measuring power as applied to motor cars might jump to the conclusion that 1 h.p. would not be of much use in driving a boat, but such is not the case. Most people who are familiar with canals will know how easily one man can move a heavily loaded barge, and if the same man had a rope over his shoulder and were pulling the boat along at a speed of half a mile an hour, a second man assisting the first would not suffice to double the speed, for the resistance of the water is such that four men would be needed.

Just the same thing occurs in regard to a marine engine. A 1 h.p. outboard motor will propel a small rowing boat at approximately 6 m.p.h., but if a substantial increase in speed is required, then the power needed in relation to the speed must be multiplied by four. Really the 1 h.p. motor is a useful size, for by the use of special alloys and the utmost care in design, a model of this power can be made to weigh no more than 14 lb. and to be so compact that it will fit into a good sized toolbox.

In the majority of outboard engines, the power unit is of the valveless or two-stroke variety, thus making for simplicity, reduced weight and a fewer number of working parts. A further advantage is that no separate oiling system is needed, for the lubricant is mixed with the petrol and both pass through the carburetter together. Separation takes place in the crankcase, the oil being deposited upon the cylinder walls and crankshaft bearings, while the petrol vapour is forced up a channel in the cylinder casting and thence into the combustion chamber, where it is compressed and fired by means of an ordinary sparking plug.



A 7 ft. 10 in. dinghy designed for use with a lightweight outboard motor. The motor is attached to a bracket on the port side. Photograph by courtesy of E. P. Barrus Ltd., London.

The ignition system of an outboard motor of this type is particularly interesting, for although a magneto is invariably used it is entirely different in appearance from those with which readers of the "*Meccano Magazine*" will be familiar in connection with motor cars, for the outboard engine magneto is built into the flywheel, thus economising space and giving a necessary measure of protection from rain and spray.

The more powerful engines may have two, or even four cylinders, but the same simplicity of the two-cycle principle is almost invariably retained.

The engine is placed horizontally, so that the driving shaft is really a continuation of the crankshaft. This is

enclosed in a casing and terminates in a gear box containing two bevel wheels supported on ball races, and in this manner the right angle drive is obtained, whilst the difference in the size of the bevel pinions allows the propeller to turn at slightly less speed than the engine. If this were not the case the propeller would have to be made much smaller and propulsive efficiency would be lost.

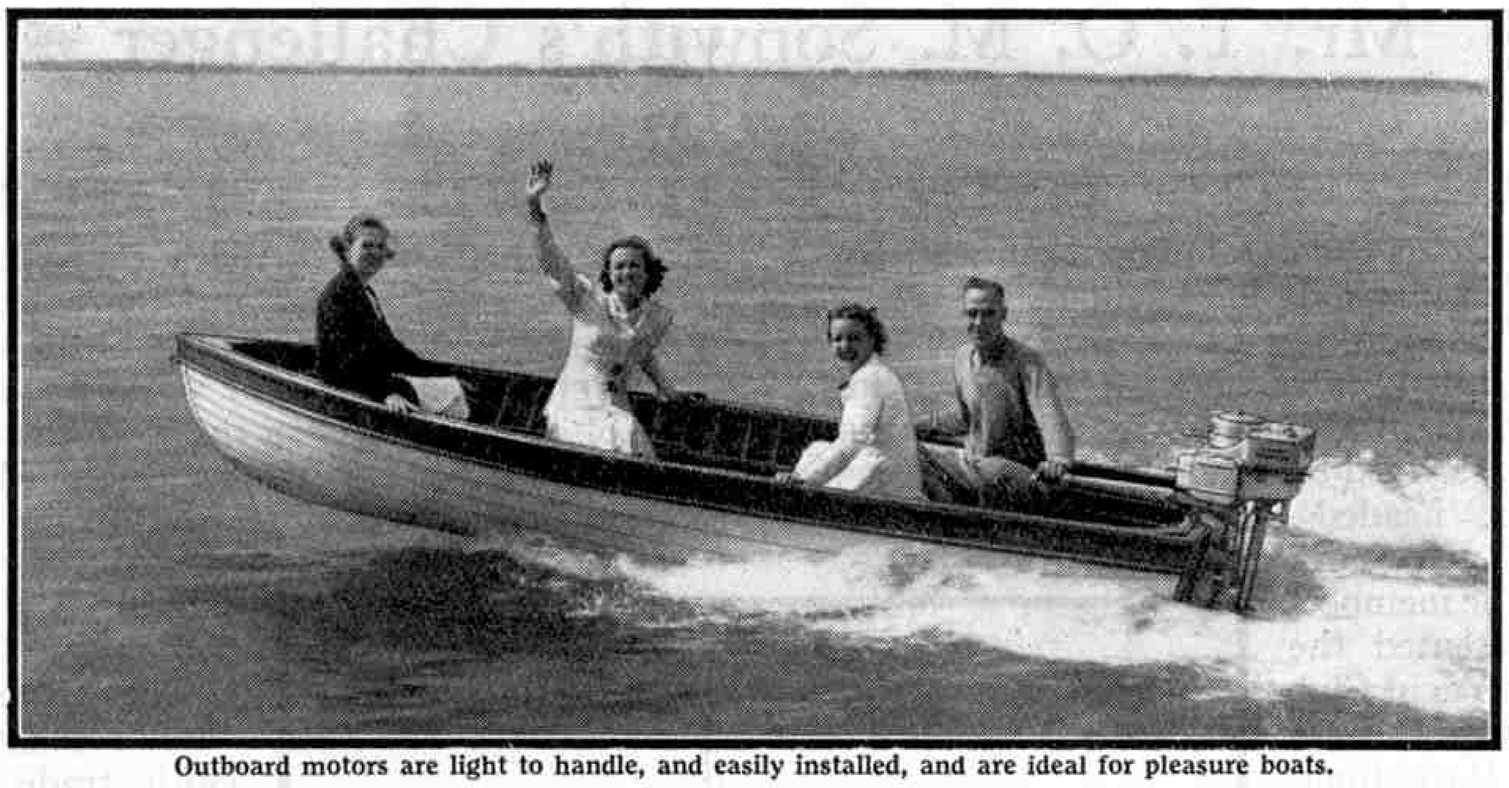
Many outboard motors are provided with safety devices to protect the propeller and shaft in the event of the underwater parts of the outboard motor striking the bottom, or coming into contact with some submerged obstruction. For example, if one were making a trip in a boat fitted with an outboard motor, and ran into shallow water and over a hard bottom which might damage the propeller, a guard, which is termed a skeg, and which extends beyond the lowermost extremity of the screw would force the outboard motor to tilt and thus clear the obstruction. If the propeller struck first, a soft pin which connects it to the driving shaft, would shear before any of the blades could be damaged, and it is the work of a few moments only to fix a new pin into position.

Many motorists carry an outboard motor with them so that when they come to some attractive lake, river or section of coast, they can hire a boat, and fit the outboard motor in position, which is the work of a few seconds, adjustable thumb screws being provided. One can then cover far greater distances than would be possible by rowing, with enjoyment and without fatigue. Some enthusiasts even go further and carry a collapsible boat as well as the engine.

Racing outboard motor boats is a thrilling sport and one that calls for a great deal of judgment when travelling at high speed, particularly when the hulls are of the light skimmer type known as hydroplanes, for the wake of another competing boat can easily upset the balance of craft that are following, unless the helmsman counteracts the effect by steering in such a manner that his boat is kept upon a level keel.

Owing to the low resistance of the racing type of hull, which travels mainly on the surface of the water, speeds of over 20 m.p.h. can be obtained with relatively low power, but when really high speeds are required, then motors developing between 30 h.p. and 50 h.p. are by no means uncommon, and results of over 60 m.p.h. have been recorded.

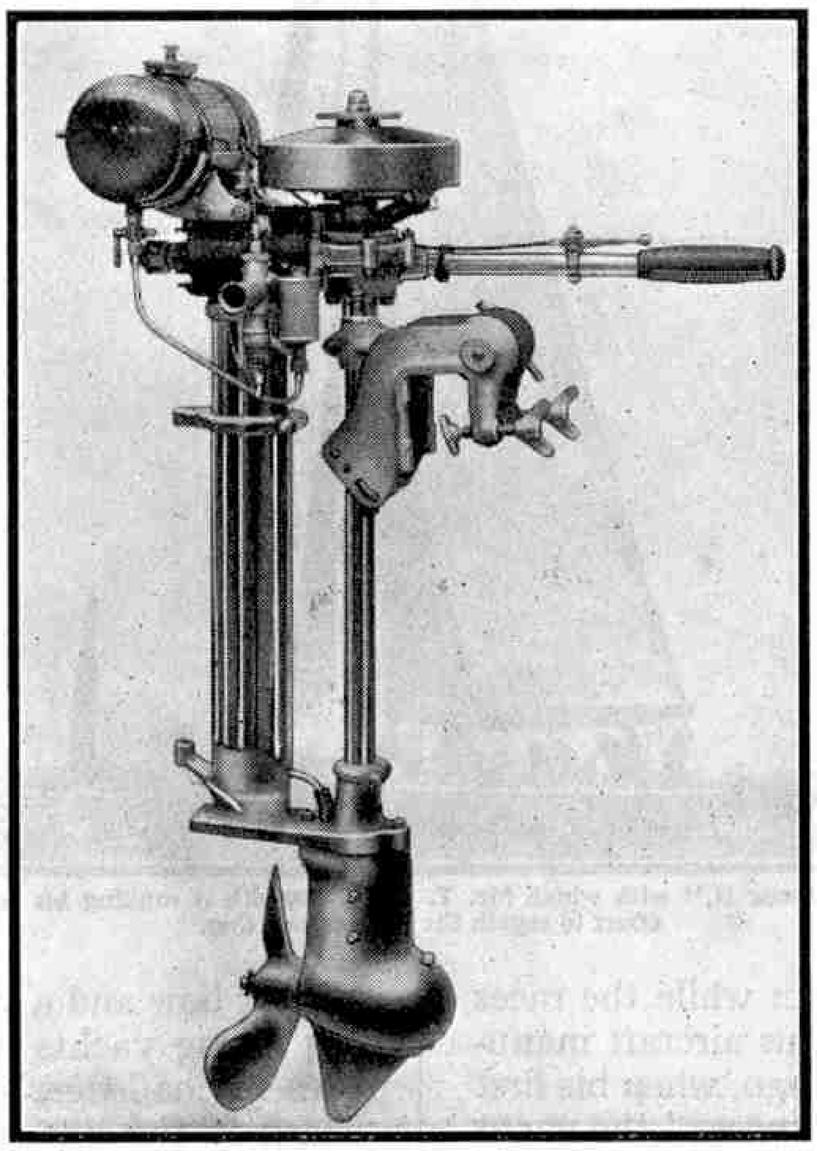
Many of the craft to which outboard motors are fitted were never intended for mechanical propulsion. An engine that vibrates to any considerable extent would not only be unpleasant to the occupants, but might make it necessary to stiffen the transom or stern. Engines that are well balanced mechanically and are not subject to vibration therefore are essential for comfort and safety.



Outboard motors are light to handle, and easily installed, and are ideal for pleasure boats.

It must not be thought that outboard motors are used solely for pleasure purposes, for fishermen often make use of them, and they are employed for the propulsion of barges. Their portability makes them extremely useful, for a motor of this type can be used on one boat and then changed to another whilst the first is being unloaded.

Now that the production of outboard motors has reached an amazingly high figure, costs have correspondingly been reduced, and it is possible to purchase a new outboard motor, weighing only 14 lb., and so easily portable by children as well as adults, for so little as £11/11/–. In view of the fact that a good mahogany hull can be obtained for about £10/–/–, it will be realised that for little more than £20/–/– one can become the owner of a complete motor boat with plenty of room for two or three people, and space to spare for camping equipment. Fortunately there is no tax to pay, apart from that upon fuel, nor is any licence required, and as an outboard engine is extremely simple to handle, the sport is available for young and old alike.



A typical outboard motor. Steering is effected by turning the propeller. Photograph by courtesy of the Bristol Motor Boat Co.

There is no doubt that the outboard motor is introducing more and more people to the joys of holidays on river and sea. Those who have not experienced it cannot realise the exhilaration of gliding smoothly through the water, away from the noise, bustle and nerve strain of the roads. There is little that can go wrong with an outboard motor, even in the hands of a beginner; and when two or three people share a boat the running expenses are surprisingly low.

For the information in this article we are indebted to Mr. J. W. Shillan, Managing Director, The British Motor Boat Manufacturing Co. Ltd., London, who will be pleased to answer queries addressed to him by readers of *"Meccano Magazine."*

The "America's Cup" Race

Mr. T. O. M. Sopwith's Challenger

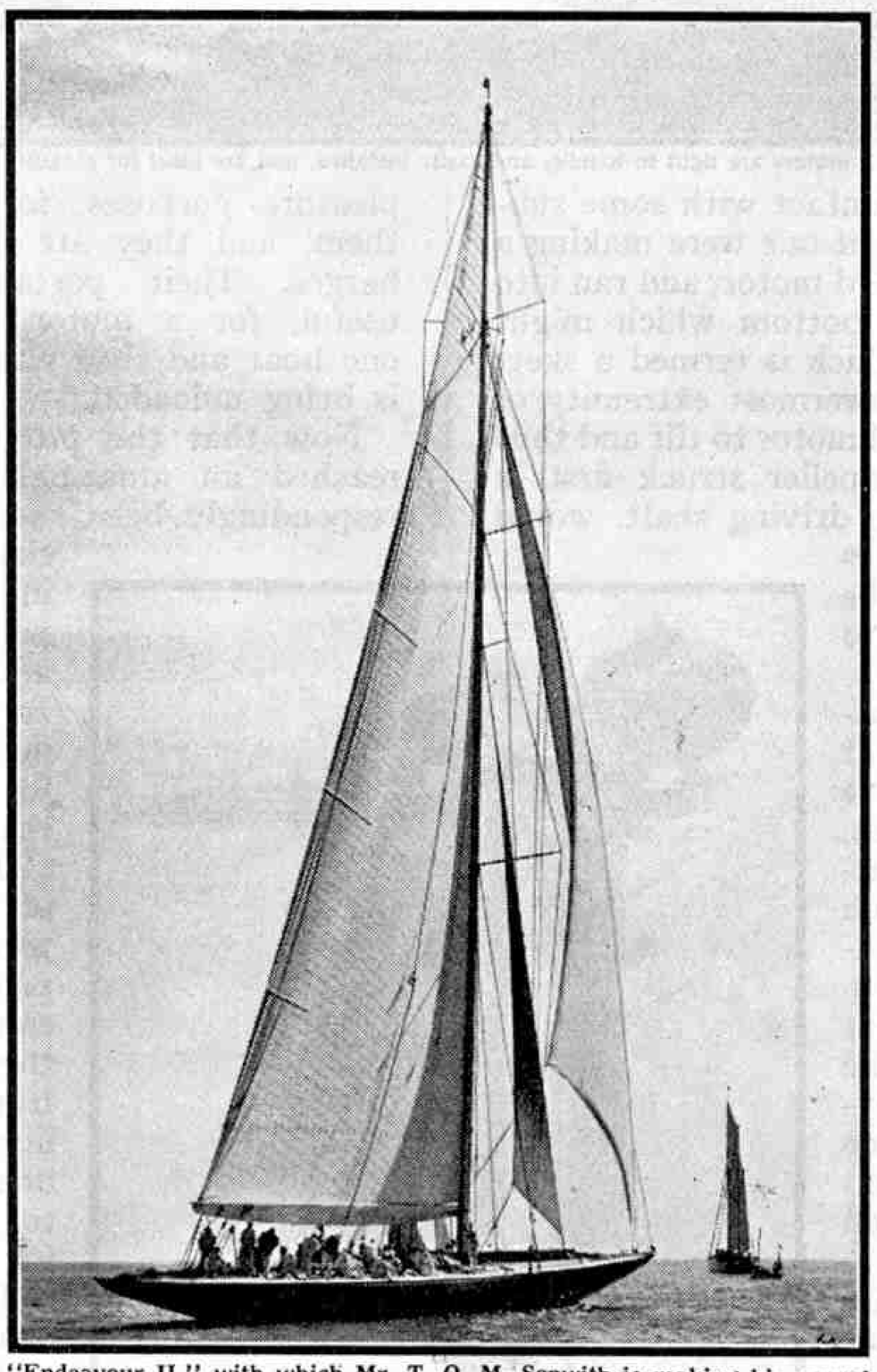
By Arthur Lamsley

THE *"America's Cup"* is the one hundred guinea silver cup presented as an international yacht racing trophy by the Royal Yacht Squadron at Cowes in August 1851, and was won by the United States schooner *"America"* in a race round the Isle of Wight against a large fleet of British yachts. *"America"* was owned by a syndicate of prominent American yachtsmen, headed by John Stevens, then Commodore of the New York Yacht Club. In 1857 the members of the syndicate presented the cup to the New York Yacht Club as a perpetual Challenge Cup for yacht racing between the nations, and the trophy became known as the *"America's Cup."*

During the eighty-six years that have elapsed since that famous race, British yachtsmen have made fifteen unsuccessful challenges to regain it. Undaunted by past failures, the Royal Yacht Squadron are challenging again this year with the *"Endeavour II,"* owned and helmed by Thomas O. M. Sopwith, one of its members.

Known as the most romantic sporting trophy in the world, the *"America's Cup"* was originally worth £100; to-day, if melted down and sold at present silver prices, it would be worth about £19 12s. 0d. In successful defence and unsuccessful challenges it has cost yachtsmen nearly three million pounds sterling. It is estimated that Sir Thomas Lipton alone spent a million pounds trying to win back the cup. He made five unsuccessful attempts to do so, the last occasion being in 1930. Each of the five yachts he had specially built for this purpose was named *"Shamrock,"* and there was the greatest excitement on both sides of the Atlantic Ocean while the races were in progress. Mr. Sopwith, the famous aircraft manufacturer and sportsman, tried four years ago, when his first *"Endeavour"* won two races against *"Rainbow,"* the yacht chosen to resist his challenge, but lost four, and with them the series. Mr. Sopwith, who is challenging again during the Coronation yachting season with *"Endeavour II,"* will be lucky if he gets out of his two challenges under £400,000. Fancy spending £3,000,000 to win £19!

"Endeavour II" was built of British steel, rolled and tested at the United Steel Company's Works, Appleby, Cumberland. She is an all-Empire production. The mahogany of which her rudder was shaped came from Lagos, in British West Africa; the yellow pine for the decks from Western Canada; and the cotton for her sails was grown in the Sudan and woven at the small market town of Crewkerne, Somerset. The yacht was built by Camper and Nicholsons, Gosport, on the western shores of Portsmouth Harbour, and the sails were fashioned in an adjoining sail loft, owned by Ratsey and Lapthorn, where 130 years ago the sails were made for Nelson's flagship H.M.S. *"Victory,"* before sailing for Trafalgar.



"Endeavour II," with which Mr. T. O. M. Sopwith is making his second effort to regain the "America's Cup."

The township of Crewkerne came romantically into the sail-cloth trade. Previous to 1685 most of the sail-cloth for British ships was woven in France, but in that year refugee Huguenots came over and settled in the English county and brought their trade of sail-cloth weaving with them. Since that time this rural district has actually created a monopoly for the making of the finest sail-cloth in the world.

An approximate idea of the size of *"Endeavour II"* may be gained from the following simple measurements. Her extreme length from the tip of her long pointed bow to her counter is about 132 ft., while her length on the waterline is 87 ft., and her extreme beam 22½ ft. Her draught, meaning the depth she is in the water from her waterline to the bottom of her keel, is 15 ft., and she is of 164 tons displacement. The part of her that will fascinate the general public will be her huge sails, especially the great Bermudian mainsail, which is 153 ft. from the deck to the peak, therefore nearly as high as Nelson's monument in Trafalgar Square.

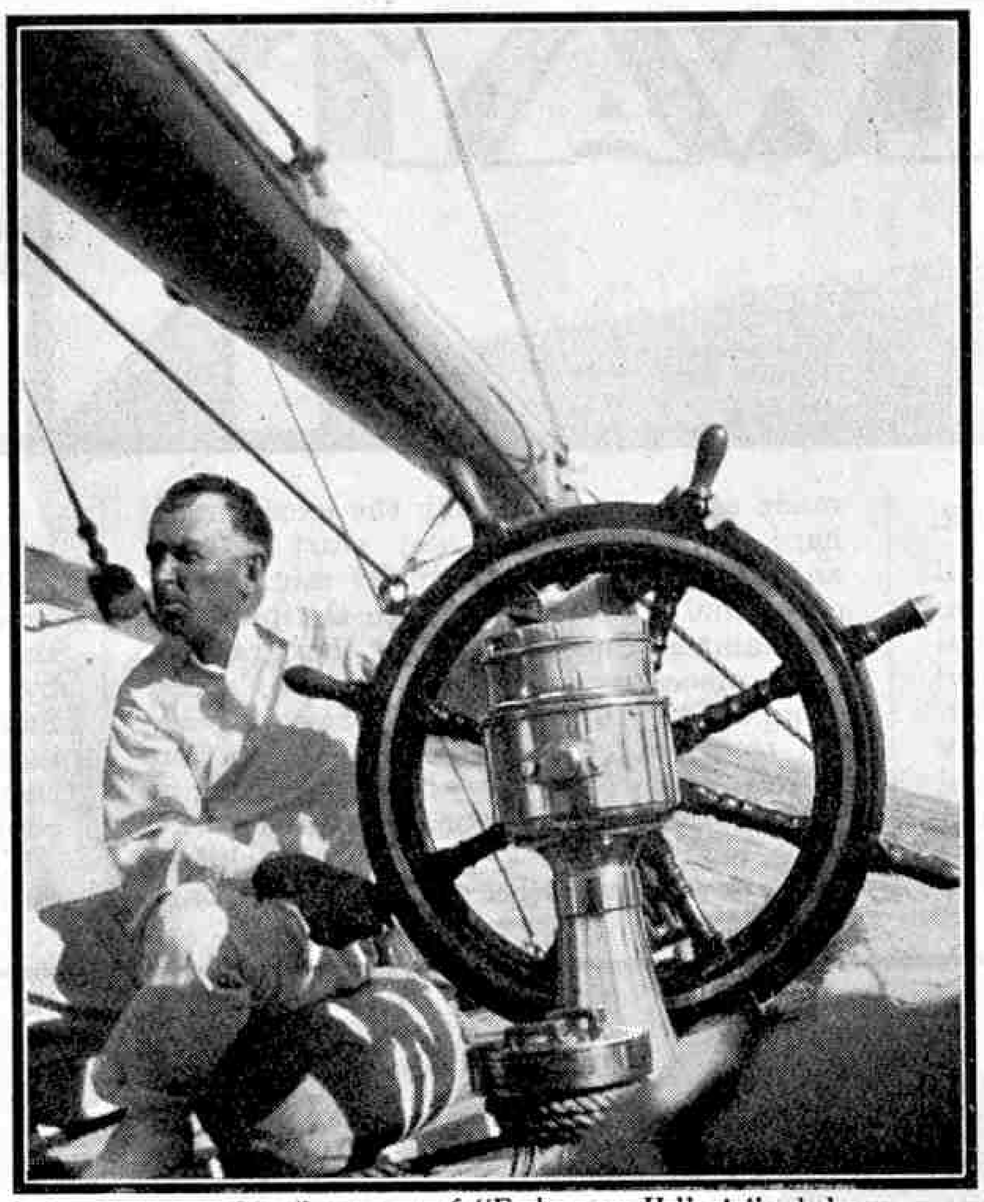
The schooner *"America"* had a clipper bow and a straight keel, but the hull form of these big racing yachts has changed since those days, and the present challenger's bow is like a half spear and equally as sharp on the extreme nose, while the hull lines fine out to the counter very much like the tail of a large fish. Indeed, *"Endeavour II's"* hull might be likened to a giant shark cut in half with a fin-shaped keel. The lay student of Naval architecture will find this feature extremely interesting, and it will be seen that the lines of our newest yacht are not too dissimilar from those of her ancestors, the Arab dhows of 2,000 years ago, whose designers copied the great fish of the Indian Ocean.

Another innovation in *"Endeavour II"* is that her

designer has given her slightly "tumble-home" sides, resembling the above waterlines of the old "wooden walls" of England, a striking characteristic of the H.M.S. "*Victory*" type of ship of a century and a half ago. "Tumble-home" sides prevent the deck being awash when the yacht is heeling to a smart breeze.

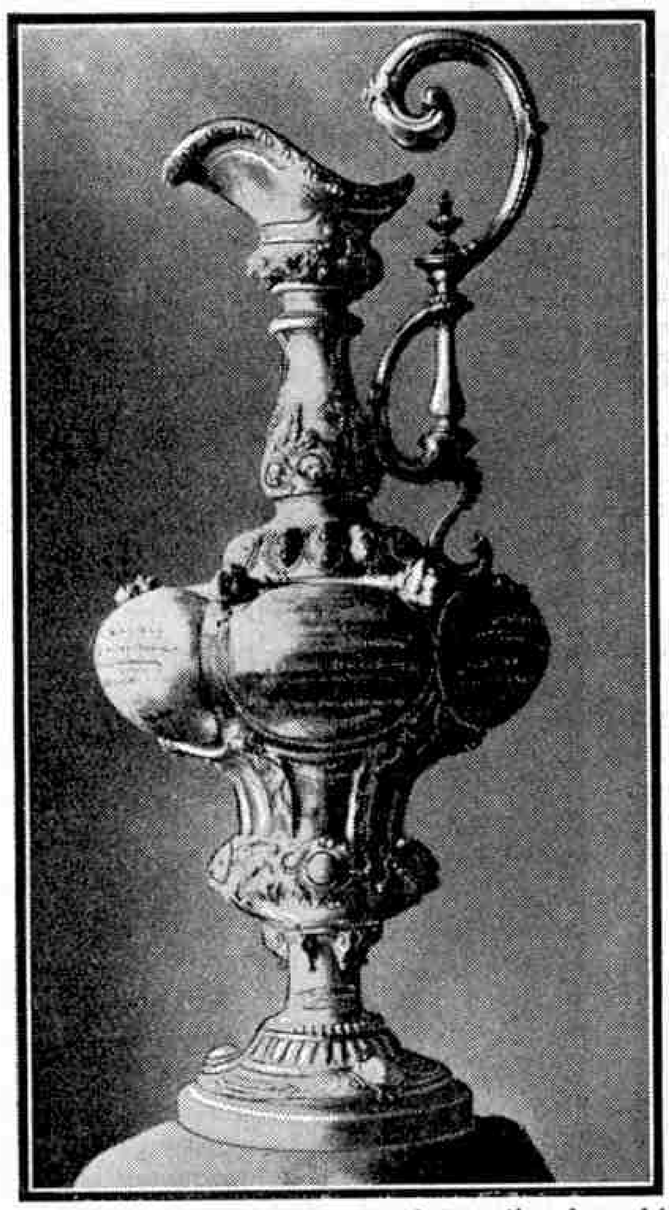
The steel plates of the hull of the yacht are riveted to steel frames, and the underwater plates are polished. The plates were specially prepared before being worked to prevent rust and scaling, and so after plating they can easily be polished to a fine surface.

Decking the yacht was a masterpiece of workmanship. More than 8,000 ft. run of selected yellow pine were used, about 2 in. square in section; while making the deck watertight required nearly 50,000 ft. of caulking cotton punched into the seams and secured with a special marine glue. The skylights, deck fittings, and companion are of mahogany. A low foot rail is fitted to the covering board, otherwise the deck is flush.



Mr. Sopwith, the owner of "Endeavour II," at the helm.

Nature has been copied also in the design of the mast, which is constructed of high tensile steel. The bamboo cane has served as a model for this tall, slender steel spar, 168 ft. long. The knots or "rings" of the bamboo cane have been modelled in special steel, and electrically welded inside the steel tube. The seams of the steel mast are butt-edged, and also were welded by an electrical process. Sheffield manufactured stainless steel has been used in many of the challenger's fittings.



The "America's Cup," the international yacht racing trophy.

The main boom carrying the foot of the great Bermudian mainsail is one of the remodelled "Park Avenue" type, a hollow triangular spar fashioned in silver spruce. These novel booms are now used in the big yachts in America as well as England. The foot of the sail runs on tracks, or "avenues," which allows it to curve to the wind, thus increasing its efficiency by applying a principle discovered in the science of aeronautics.

Laymen will be surprised to learn that this huge Bermudian mainsail was all double stitched by hand, although we live in a machine age, and the yarn used in the actual sewing was of the same material as the sail-cloth. This latter provision is essential, as the sail will then behave as one piece under all climatic conditions. Actually it was made of 120 pieces of sail-cloth, 18 in. wide, and took four months to prepare. The sail maker stitches with a needle of triangular shape, and his labours were finished only after two-and-a-half-miles of stitching! At the peak of the sail the pressure is 10 tons to the sq. in. when the yacht is sailing in a good breeze.

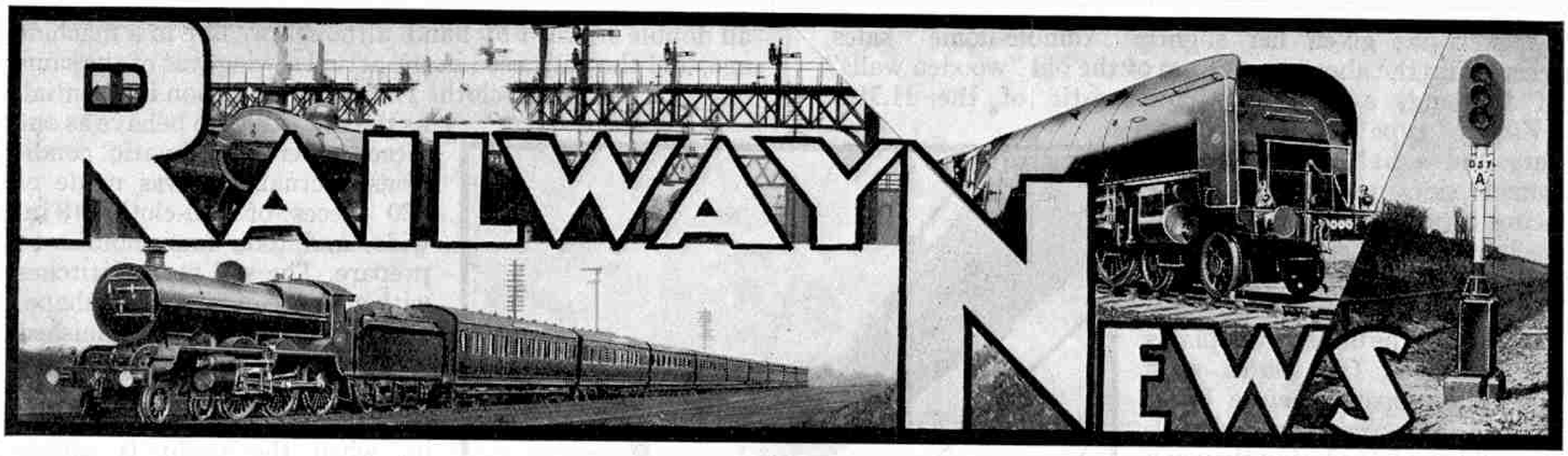
The use of mechanical appliances has added to the efficiency of yacht racing. These mechanical gadgets are quite legitimate, and within the sportsmanship of the racing rules. In the British vessel quite a number of scientific instruments have been brought into service, including a mechanical racing flag attached to a wind-pressure gauge, which, on test, have added considerably to the knowledge of how to get the best speed from combinations of sails in different weights of wind.

"*Endeavour II*" has a fine sporting chance of regaining the "*America's Cup*" at long last. During a series of races towards the end of last season I was impressed by her superiority, especially to windward, to the first "*Endeavour*," which, until then, yachtsmen on both sides of the Atlantic considered to be the fastest J Class yacht afloat. "*Endeavour II's*" chances are greatly enhanced by the fact that she will have at least six weeks' extensive tuning-up trials with "*Endeavour I*" over the actual race course off Newport, Rhode Island, U.S.A., before the cup match begins on 31st July. No other British challenger has ever had such adequate preparations.

Mr. Sopwith will enjoy another important advantage. In previous contests the challenger had to name 10 months in advance the yacht he intended to race, while the defender was allowed to make his choice at the time of the actual contest. The defender now must name his vessel seven days before the race, and the corresponding time for the challenger is 30 days.



Mr. Charles Nicholson, the designer of "Endeavour II."



Remarkable Holiday Working on the G.W.R.

During a recent weekend of exceptional traffic the first portion of the 3.30 p.m. West of England express from Paddington reached Newton Abbot 22 min. early! The locomotive work, recorded by Mr. O. S. Nock, although very good and steady throughout, did not rise to any special heights of brilliance. It was the astonishingly clear road, on a day when almost every train of importance was running in two or three parts, that allowed so remarkable a time to be made, the regular stops at Westbury, Taunton, Exeter, and Teignmouth being omitted so that this portion could be worked through as quickly as possible. The load throughout was a very full one of 13 coaches, weighing 450 tons all told; the engine was No. 6022 *"King Edward III,"* in charge of Driver King, of Laira shed, Plymouth.

A leisurely start was necessary to avoid delays from the 3.15 p.m. Gloucester and Cheltenham express running in two parts ahead. Driver King passed Twyford, 31 miles, in 32¾ min., and managed to get through Reading with only a slight check. Almost immediately afterwards the train was stopped dead at Oxford Road Junction. From the restart *"King Edward III"* covered the 136.5 miles on to Exeter in 133 min., passing that station at reduced speed owing to a signal check. Up the long ascent to Savernake speed never fell below 50 m.p.h.; 77 m.p.h. was touched descending to Westbury, 82 m.p.h. near Bruton, and 76½ m.p.h. amid the then widely-flooded country around Athelney. Up the 1 in 80 to Whiteball tunnel the lowest speed was 27½ m.p.h. A sustained 72–78 m.p.h. all the way down the Exe valley took the train through Exeter in 175 min. from London, 173.5 miles, delays included, and very quiet going sufficed round the Devon coast section to complete the 193 7 miles from Paddington to Newton Abbot in exactly 200 min.

A load of 450 tons was far too great to be taken over the terrific grades of the South Devon line, and a 5 ft. 8 in. 4–4–0 of the "Bulldog" class, No. 3453 *"Seagull"* was therefore attached as pilot. In spite of heavy continuous rain the two engines made a fine run, covering the exceedingly hard 34 miles in 46½ min. start to stop and arriving at Plymouth 23 min. ahead of normal time. Going up to the pinnacle of Dainton Summit, where the gradient is in places as severe as 1 in 36, speed dropped to 19 m.p.h. The two engines fell to 26 m.p.h. on the 1 in 57 portion of Rattery incline. Quiet downhill running, with a severe slack for permanent way work near Tavistock Junction, concluded a praiseworthy piece of train operating.



G.W.R. 4-6-0 locomotive "Manorbier Castle," as modified to reduce wind resistance, on an excursion train. A feature of G.W.R. summer working is the system of numbers prominently displayed in front of the engine to assist the staff in identifying a particular train. Photograph by M. W. Earley, Reading.

L.M.S.R. Locomotive News

In addition to the streamlined 4–6–2s, which are the subject of a special article on page 380, Crewe Works have recently begun to turn out a new series of 0–6–0 freight tender locomotives, the first being No. 4562. These have a new type of chimney as compared with the earlier standard freight class. No. 8026 of the 2–8–0 type is also in traffic.

New 2–6–4 tanks from Derby are Nos. 2491–4, and new "5P5F" 4–6–0 engines from contractors are Nos. 5346–5365.

Condemnation of non-standard types proceeds apace, former L.N.W.R. engines being particular sufferers. No. 5972, of the "Claughton" series, and Nos. 25693, 25773, 25792, of the "Prince of Wales" class, have now disappeared, and other engines recently scrapped include the "Georges," No. 5408, *"Holyhead"* and No. 25326, *"Sir Thomas Brooke,"* and No. 25294, *"Druid,"* of the superheated "Precursor "series.

G.W.R. Summer Services

On 5th July the full summer train service will come into force on the G.W.R., the existing services then being increased by over 1,000 additional week-day and Sunday trains. Existing train times will be reduced by a total of 1,580 min. daily, and there will be 19 expresses scheduled to complete their runs at 60 m.p.h. or over.

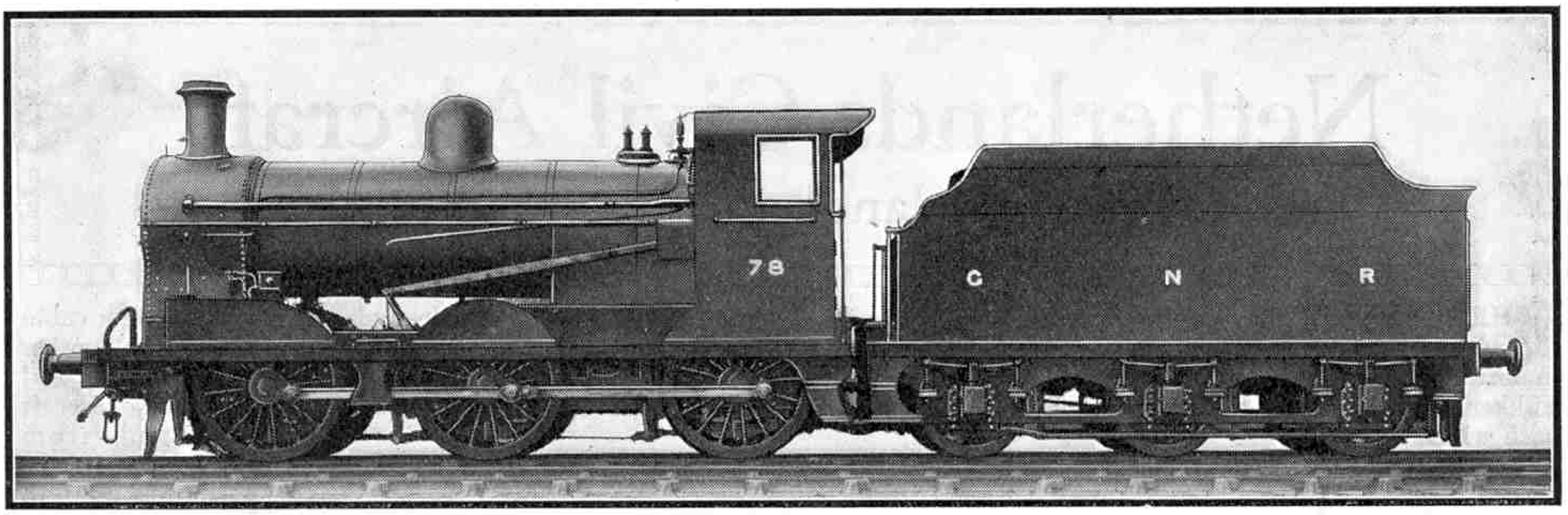
The *"Cornish Riviera Limited"* will run every day, and on Sundays, commencing 11th July, it will be accelerated by 26 min. to Plymouth. The *"Torbay Express"* is to be run in each direction on Sundays as well as weekdays. Sunday services have in fact been increased by 350 additional trains in order to meet the increasing tendency toward Sunday holiday travel.

The revival of trade in South Wales has led to the introduction of a new business express for Newport and Cardiff, which runs every day from Monday to Friday, leaving Paddington at 6.55 p.m. Cheltenham and Gloucester also have a new afternoon service to London. Cross-country services between the Midlands and coastal resorts and through carriage services also are being augmented. The 18 streamlined railcars operated by the G.W.R. on main line and branch services will cover a total daily mileage of 3,333, an increase of 288 miles per day over last summer.

"Tottenham Hotspur"

An important part of the proceedings at one of the popular exhibitions of L.N.E.R. locomotives and rolling stock held at Walthamstow recently was the naming of a new "Football Club" engine. This was 4–6–0 No. 2871, *"Tottenham Hotspur."* The naming ceremony was carried out in the presence of officials of the club after which the engine is named.

The other exhibits included No. 4482, *"Golden Eagle,"* and No. 2509, *"Silver Link,"* two of the famous Gresley streamlined "Pacifics." In addition, a cinema van, chemical van, signalling demonstration van and examples of modern passenger rolling stock were shown, and visitors enjoyed rides on mobile and stationary cranes, and other novel amusements.



G.N.R. (I.) 0-6-0 locomotive No. 78. This is one of the new light goods engines of class "UG" that are described on this page. They incorporate the usual features of the Company's standard practice, but a departure is the provision of side-window cabs. Photograph reproduced by courtesy of the G.N.R. (I.).

New G.N.R. (I.) Locomotives

Five new locomotives of the 0–6–0 type have recently been completed at the Dundalk Works of the G.N.R. (I.), and numbered 78 to 83. They have been built to the designs of Mr. G. B. Howden, Chief Engineer of the Company, and the first of them is illustrated on this page. The engines are intended for use on light goods and excursion trains, and as the weight imposed on any individual axle does not exceed 15 tons 4 cwt. the engines are suitable for running over all sections of the G.N.R.

In the general construction of these locomotives as many standard parts as possible have been employed, the boiler, cylinders, motion and crank axle being interchangeable with those of existing classes. As the photograph shows, the engines partake of the usual character of 0–6–0 type locomotives. The cylinders have a diameter of 18 in. and a piston stroke of 24 in. They are located between the frames, and are connected to the crank axle of the centre pair of coupled wheels. The diameter of the wheels is 5 ft. 1 in. The boiler, which has a round-topped fire-box and is provided with superheating apparatus, has a diameter of 4 ft. 3 in. and a total heating surface of 863 sq. ft. The superheating surface is 168.6 sq. ft. The working pressure is 200 lb. per sq. in. The smoke-box is shallow so that an ash ejector has been fitted as an experiment.

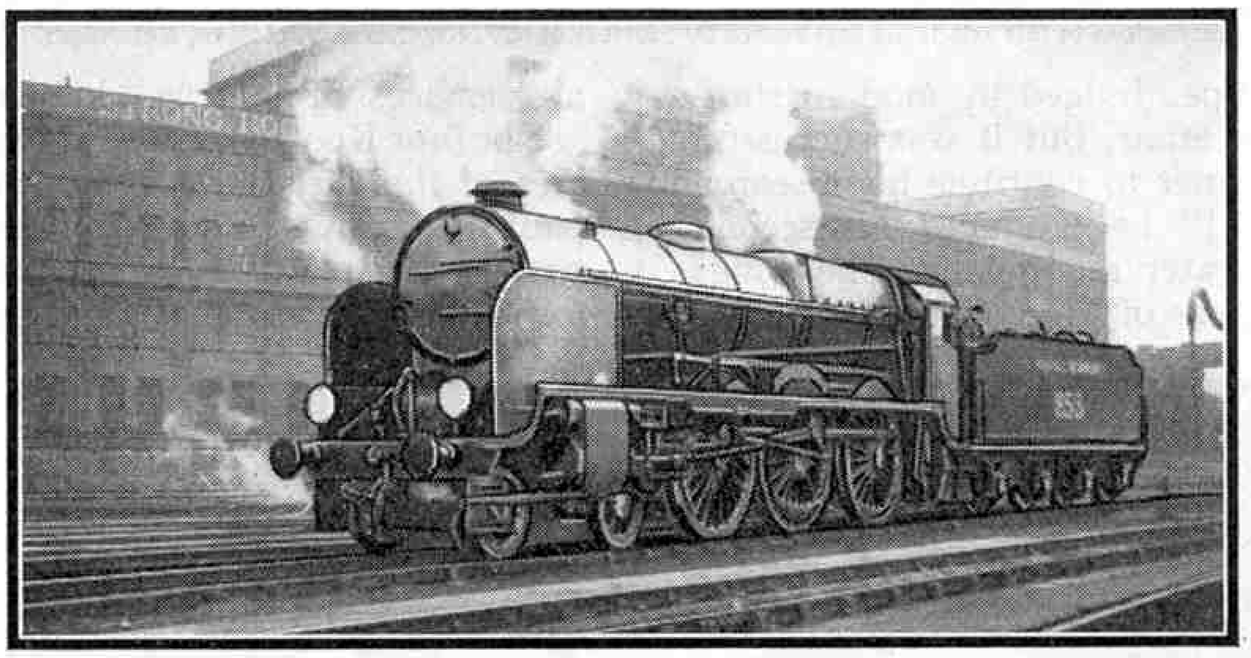
The cab is roomy with tip-up seats for the crew and a sliding window on each side; all the fittings are arranged so that they can be conveniently handled. The regulator handle is of the extended type, for convenience in shunting.

The tender is of the latest standard type with high side sheets having turned-over top edges. It accommodates 3,500 gallons of water and 6 tons of coal. The total weight of the engine and tender in working order is 84 tons 2 cwt.

The "Coronation" Scottish Expresses

An important event this month is the inauguration on 5th July of the new high-speed trains on the West Coast and the East Coast routes to Glasgow and Edinburgh respectively. As announced previously in these pages the L.M.S.R. train is to be called *"The Coronation Scot,"* and the L.N.E.R. train *"Coronation."* A full description of the L.M.S.R. train for this service appears on page 380 of this issue.

Each train is to make one stop on its northward journey, the L.M.S.R. representative at Carlisle and that of the L.N.E.R. at York. Streamlined 4–6–2 locomotives are to be used on each route, and special liveries have been adopted for them and their trains. There is no suggestion of reviving the old West Coast and East Coast rivalry. The destinations of the two trains and their departure times from London are different, one leaving Euston at 1.30 p.m. and the other leaving King's Cross at 4.0 p.m. Between London and York on the down journey the L.N.E.R. train will be the fastest train in the British Empire, covering the 188-odd miles at an average speed of 71.9 m.p.h.



S.R. 4-6-0 locomotive No. 853 "Sir Richard Grenville," of the "Nelson" class, at Battersea Sheds. This photograph was the prize-winning entry of E. C. Morgan (H.R.C. No. 10375) in a recent H.R.C. Photographic Contest.

L.N.E.R. Streamlined *"West Riding Limited"*

In September next the L.N.E.R. will introduce another new streamlined train, to be known as the *"West Riding Limited."* This train will provide the fastest service ever known on any route between Bradford, Leeds and London, and will run the 186 miles between Leeds and King's Cross at an average speed of 68 m.p.h. Between the same points on the return journey the average speed will be 68.5 m.p.h.

It is interesting to note that the name of the train has been chosen from 675 suggestions that were put forward as a result of a request by the L.N.E.R.

Intensive Special Traffic on the S.R.

The Coronation period produced the most intense spell of traffic pressure ever known on the Southern Railway. Before the event foreign delegations and visitors from abroad were arriving day after day at Victoria and Waterloo, and 17 special trains had to be provided for 51 different parties. All records for Southampton Docks were broken by other overseas visitors. Between 1st May and 10th May over 50 special boat expresses were run from Southampton, bringing passengers from 28 ocean liners.

On Coronation Day itself a 24-hour train service was maintained, and 310 special trains arrived in London before 7 a.m. To bring in soldiers, sailors and marines, who lined the route and performed other Coronation duties, 52 specials were required.

The climax was reached with the special traffic for the Royal Naval Review. Over 35,000 passengers were conveyed to Portsmouth and Southampton in 74 special trains, and 21 steamers of the S.R. fleet were among the vessels used as floating "grandstands" for the great spectacle. The Naval Review traffic included the carriage of probably the largest number of Royal personages ever conveyed to one event! In between all this activity, in which not the slightest hitch occurred, was sandwiched the Whitsun holiday traffic involving 150 additional trains from London alone!

Euston, 1837–1937

Euston, then known as "Euston Square," was brought into use 100 years ago this month. It was then the London terminus of the famous London and Birmingham Railway, the first British main line trunk route, of which the partial opening from Euston to Boxmoor occurred on 20th July, 1837, and the opening to Tring in the following October.

Now, a century later, Euston is the headquarters of the mighty L.M.S.R. system, and plans are well in hand to effect its reconstruction. It has been enlarged from time to time, and the new work will make it more suitable for modern traffic requirements. The rebuilding of the hotel and offices also is included in the scheme of modernisation.

Netherlands Civil Aircraft

Transport Monoplanes and Training Biplanes

THERE are only four aircraft manufacturing firms in Holland, but two of them are pioneers, who began to make aeroplanes in the early days of aviation. These are the Fokker company, and the N.V. Koolhoven Vlietuigen, with which this article is concerned.

Mr. Frederick Koolhoven, the Managing Director and Chief Engineer of the company bearing his name, designed and flew his first aeroplane in 1910. It was a biplane with the skeleton fuselage and "box-kite" tail unit that were characteristic of the early machines of this type. Judged by modern standards the FK 1 was a crude affair, but it was successful enough to encourage its designer to continue his research and experiments, and in 1912 he produced his second machine, a high wing two-seater monoplane. The wings were braced by many wires some of which extended downward to the hubs of the bicycle-like wheels of the undercarriage, and others upward to the top of two inverted V-shaped frames mounted upon the fuselage, immediately in front of the foremost cockpit. The FK 4, as the aeroplane was called, attracted public attention by winning the first British trials for military aircraft.



The FK 43 four-seater cabin monoplane in which the long telescopic legs of the undercarriage extend up to the wing. The illustrations to this article are reproduced by courtesy of N.V. Koolhoven Vlietuigen, Rotterdam.

Koolhoven gave further proof of his enterprise by producing in 1913 a single-engined twin-float seaplane of the high wing monoplane type, and in 1915 he designed a very efficient single-engined biplane. The biplane was known as the FK 8, and several thousands of this aircraft were used for artillery reconnaissance by the Allied Forces during the Great War. Other efficient military types of Koolhoven aircraft were introduced during the War period.

When hostilities ceased Koolhoven turned his attention chiefly to developing civilian aeroplanes, and in 1919 he produced the FK 26 single-engined biplane, the first cabin aeroplane in the world. It was followed by many other Koolhoven civil types as flying increased in popularity, and commercial air services became established. These aircraft ranged from light sports aeroplanes to twin- and triple-engined air liners. The FK 33 air liner, introduced in 1924, was for many years the largest aeroplane built in Holland. It was adopted by Royal Dutch Air Lines, and was the first triple-engined monoplane employed on the air services of that well-known company.

The four Koolhoven aeroplanes illustrated here give some idea of the variety of civil aircraft produced by the company. The FK 43 shown in the upper illustration on this page is a four-seater cabin monoplane especially suitable for the private owner or the operator of an air taxi service. A great deal of attention has been paid to the comfort of the occupants, and the roomy cabin contains very comfortable and wide seats, while the deep windows provide an exceptionally good outlook from every seat. An interesting innovation is a window in the rear centre section of the wing so that the occupants of the cabin can glance backward over the aeroplane.

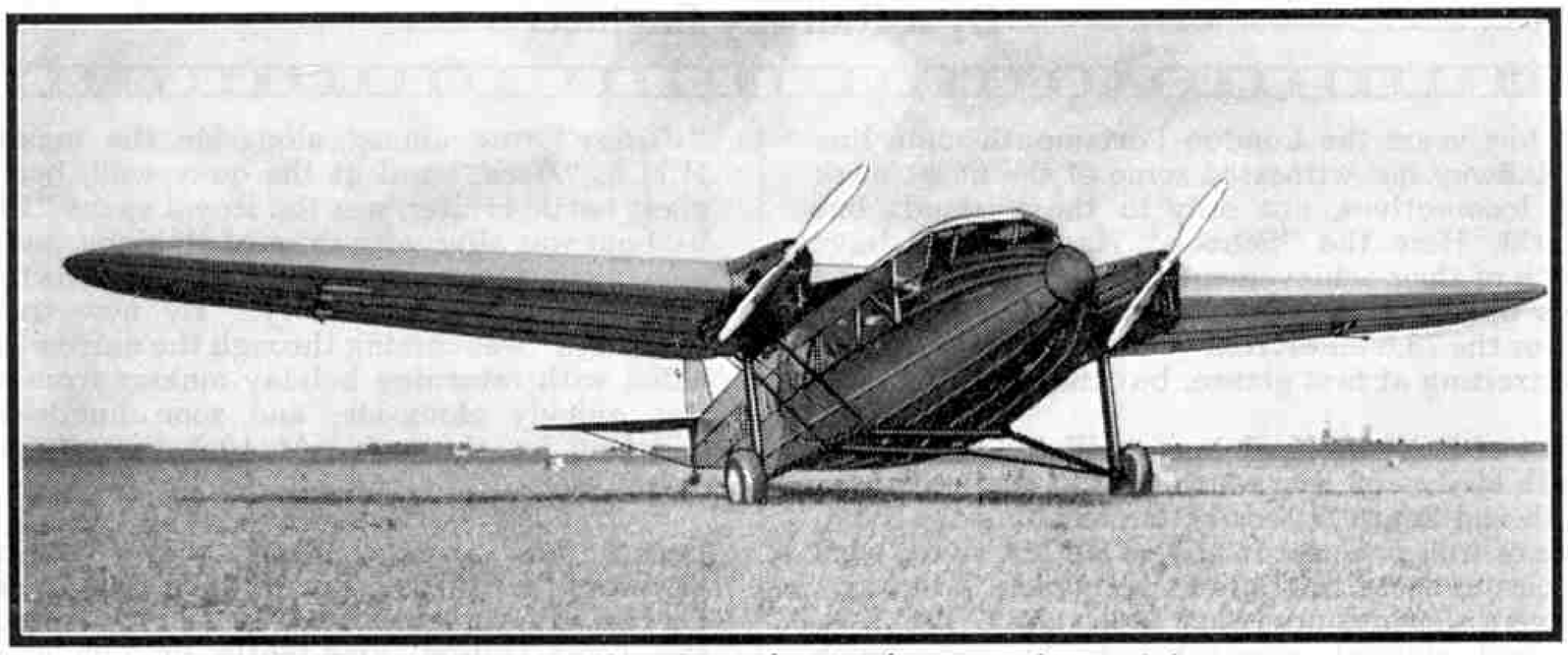


Looking down upon a Koolhoven FK 46 biplane, the type adopted by the Netherlands National Flying Schools as their standard training machine, on account of its exceptional flying qualities.

The wing is constructed in one piece and is of wood, with three-ply covering. The fuselage is rectangular in cross-section, with a welded framework of tubular steel, and the front part is covered with plywood and the rear part with fabric. The tail unit is of the normal single rudder type and is a composite structure, the fin, rudder and elevator being of tubular and sheet steel, with fabric covering, and the tail-plane of wood. The undercarriage is of the wide track, divided type, and the almost vertical telescopic legs are attached at their upper ends to

the front spar of the wing. The aeroplane is 36 ft. in span, 25 ft. 10 in. in length and 8 ft. 2 in. in height.

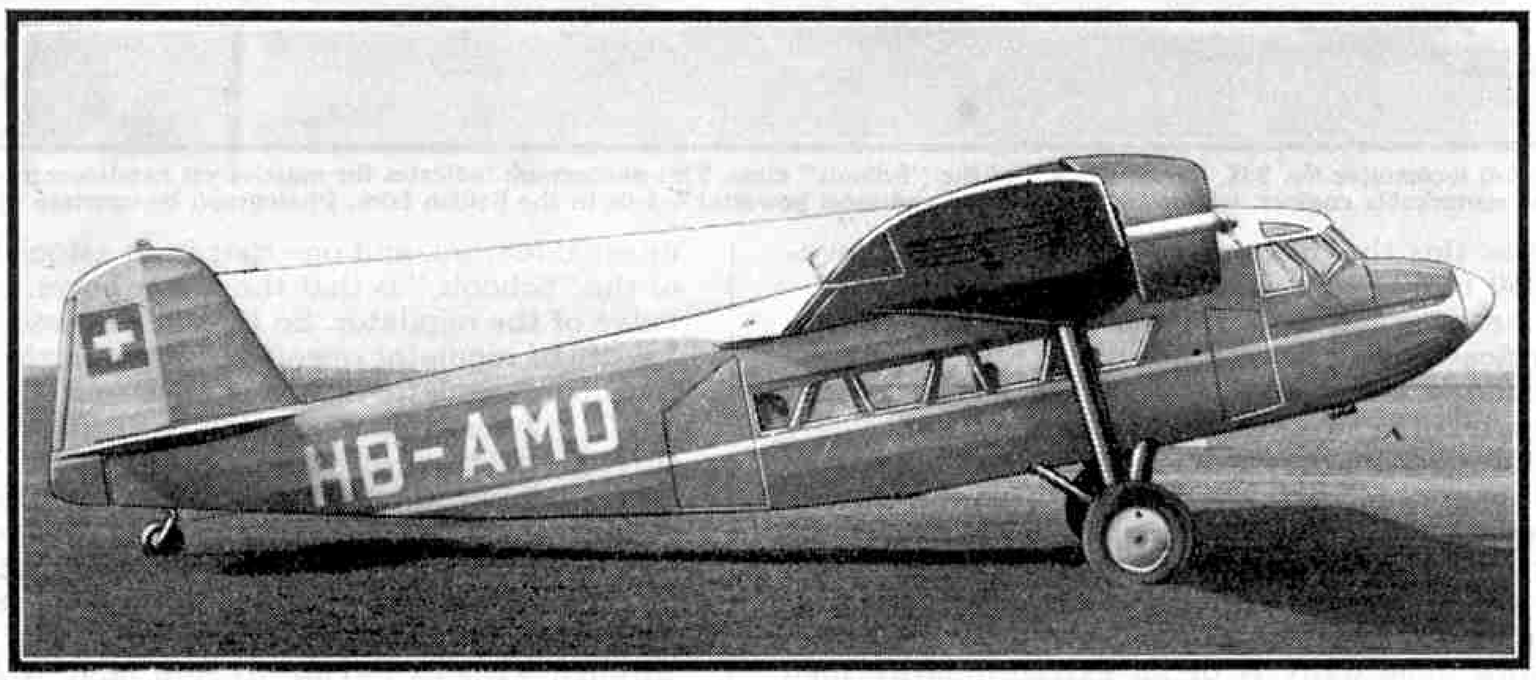
A 130 h.p. D.H. "Gipsy Major" engine is fitted, and enables a top speed of 130 m.p.h. to be attained. The FK 43 cruises at 118 m.p.h., at which speed the range is 440 miles. It has a good rate of climb for a light aeroplane, and can reach a height of 3,280 ft. in 6½ min. The service ceiling is 10,500 ft.



The FK 48 twin-engined monoplane shown above carries a crew of two and six passengers.

Several excellent types of biplanes are produced by the Koolhoven company. Most of them are training machines, and the FK 46, shown in the lower illustration on the previous page, is a good example. It is one of the safest training aeroplanes ever produced, for its flying qualities are exceptionally good, and it remains perfectly controllable far below its minimum flying speed and cannot be either completely stalled or spun. This is very important in such an aeroplane, and it is not surprising therefore that the FK 46 has been adopted by the Netherlands National Flying Schools as their standard training aeroplane. It has been proved that by using this machine the actual flying time required by pupils can be reduced by 25 per cent. Owing to its strong, yet simple construction the cost of maintaining the aeroplane in good condition is very low, and as this is of vital importance to a training school, it further explains the popularity of this machine.

The illustration shows the FK 46 to be a single-bay, equal-span biplane. It is heavily staggered, the upper wings being considerably forward of the lower ones. The wings are built of spruce and plywood, and the upper ones are attached at their inner ends to an inverted V-shaped supporting framework erected over the front cockpit. The fuselage is of tubular steel, with fabric covering, and the tail unit is of the normal monoplane type. The two open cockpits are situated one behind the other, and dual controls are fitted so that the aeroplane can be navigated by either the instructor or the pupil. There is a baggage compartment behind the rear cockpit.



Broadside view of the Koolhoven FK 50, an 8/10-seater transport monoplane with a top speed of 175 m.p.h. This type is in regular service on the air routes of Alpar, a Swiss air company.

The engine fitted is of the same type and power as that in the FK 43, and the top speed of the aeroplane is 108.6 m.p.h. The cruising speed is 96.2 m.p.h. The fuel tank is in the centre section of the upper wing, and the fuel passes by gravity to the engine. The span of the aeroplane is 26 ft. 3 in., its length 23 ft. 2½ in., and its height 9 ft. 2½ in.

The other two Koolhoven aeroplanes illustrated are the FK 48 and FK 50, both twin-engined monoplanes. The FK 48 has been specially designed and built for use on "feeder" air services, and can transport a crew of two and six passengers, together with ample luggage, for 528 miles non-stop at a cruising speed of 118 m.p.h. It is constructed on the usual Koolhoven lines, the wing being of wood with three-ply covering, and the fuselage of welded tubular steel with fabric covering. An interesting point about each wing is that the portion between the engine nacelles and the fuselage tapers in thickness and slopes upward toward the fuselage. The long outer portions of the wings taper in chord and thickness from the engine nacelles toward the tips.

The pilots' cockpit in front of the main cabin is high up in the fuselage so as to give the occupants the best possible outlook, and the navigating equipment includes, of course, dual controls. The main cabin is rather overshadowed by the wings, but large windows extend its whole length and enable the passengers to enjoy a perfect view of the scenery. The cabin is provided with an efficient heating and ventilating system. The divided type undercarriage of this aeroplane resembles that of the FK 43, but the upper ends of the long telescopic legs are attached to the underside of the engine nacelles instead of to the wings.

The two D.H. "Gipsy Major" engines are mounted one on each side of the fuselage, and enable the FK 48 to attain a top speed of 128 m.p.h. The rate of climb is 530 ft. per min. and the service ceiling is 11,316 ft. The aeroplane is 49 ft. 10 in. in span, 36 ft. 8 in. in length and 12 ft. 1½ in. in height.

The FK 50, shown in the lower illustration on this page, is a slightly larger machine than the one just described. It has been designed as a fast medium-sized transport monoplane, and incorporates the latest technical refinements, with the result that it has an exceptionally high performance for a machine of its class. This fast air liner is a high wing cantilever monoplane, and the construction of the wings, fuselage and tail unit are in accordance with Koolhoven practice.

Pratt and Whitney "Wasp Junior" engines of 420 h.p. are mounted in large nacelles in the leading edge of the wings, and give the aeroplane a maximum speed of 175 m.p.h. It cruises at 161 m.p.h., and at this speed has a range of 621 miles. The span of the FK 50 is 59 ft., the length 45 ft. 11 in., and the height 12 ft. 1½ in.

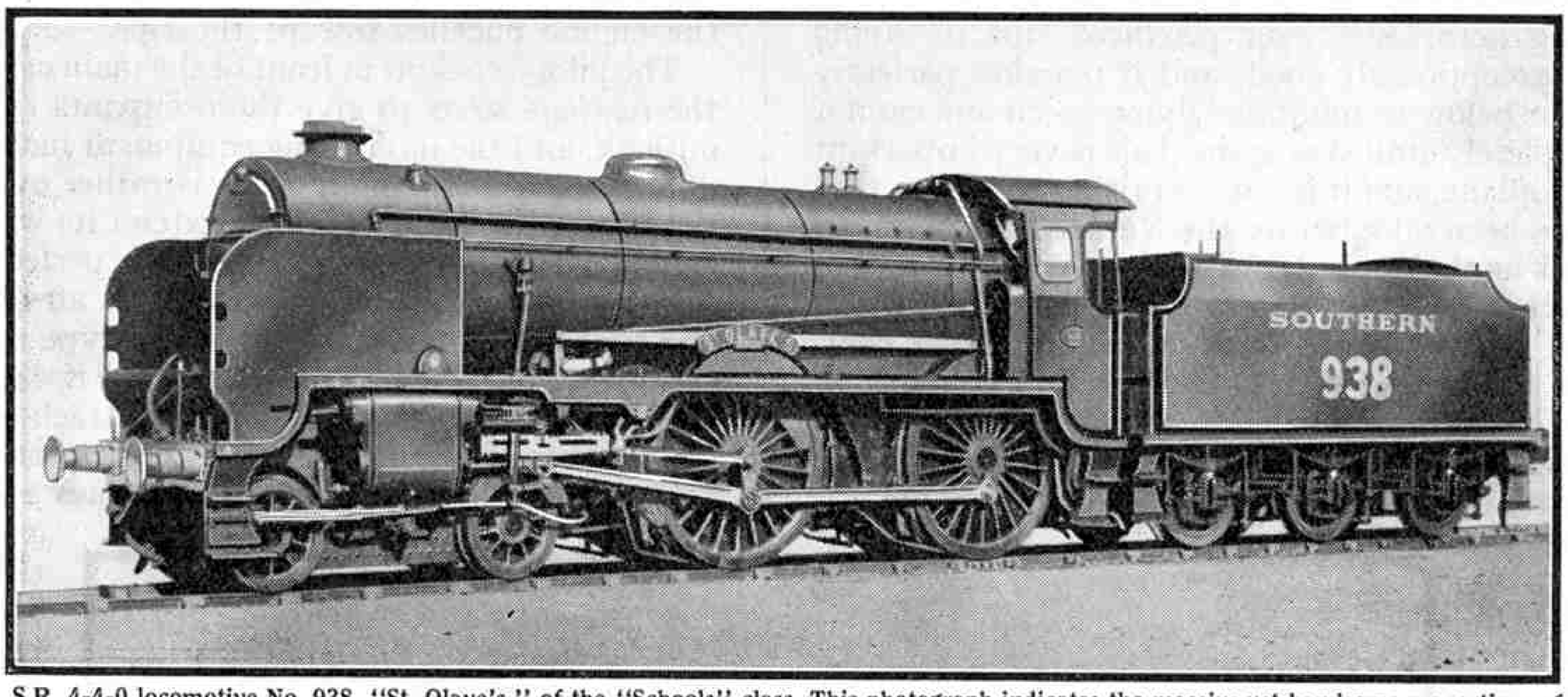
Portsmouth to Waterloo on the Footplate

A Farewell to Steam Traction

By a Railway Engineer

DURING the past few years the London-Portsmouth main line of the Southern Railway has witnessed some of the finest work ever done by 4–4–0 locomotives, not only in these islands but anywhere in the world. Here the "Schools" class engines have reached the very zenith of their achievements. Compared with some of the fast schedules operated on the Northern lines, the crack timing of 90 minutes for the 73.6 miles from Waterloo to Portsmouth Town does not seem exciting at first glance, but the route followed is very difficult.

On leaving the West of England main line, at Woking Junction, the line to Portsmouth strikes off due south, and at high altitudes crosses both the North and South Downs before reaching the coast. There are many miles of toilsome ascent at 1 in 80, but worse even than this are the numerous speed restrictions permanently in force. In addition to the severe slowings necessary at Clapham Junction, Woking, Guildford, and Havant, speed has to be very much restrained on some of the steepest descents owing to the numerous curves. Apart from the main line between Clapham Junction and Woking, the only part of the route where engines can be really "let go" downhill is in the deep trough between the North and South Downs, and this stretch is often the scene of thrilling travelling. Yet over such a road as this the "Schools" class locomotives regularly take trains of 350 to 400 tons on the fastest timings.



S.R. 4-4-0 locomotive No. 938, "St. Olave's," of the "Schools" class. This photograph indicates the massive yet handsome proportions of these remarkable engines, which are the heaviest and most powerful 4-4-0s in the British Isles. Photograph by courtesy of the S.R.

But the days of steam traction over this difficult course are numbered, and electrification will be completed this month, in time to handle the vast holiday traffic to and from the Isle of Wight. However much one regrets the superseding of steam locomotives—and in this case regret is made all the keener by the very competence of the "Schools"—this route is pre-eminently suited to electric traction. The great accelerative power of multiple-unit trains will be invaluable in recovering speed from the numerous slacks, and their hill-climbing ability will make for a much more even pace over the steep ups and downs.

The locomotive work done daily is of an extraordinarily high standard; and when recently I was privileged to ride on the footplate from Portsmouth to London the performance rose to heights of brilliance that I have never known equalled with a 4–4–0 engine. The load was right up to maximum, eleven coaches of the very latest stock weighing 360 tons tare; and by the time we left Portsmouth Town station every single seat was taken, making the total load up to 395 tons. The engine was No. 925, *"Cheltenham."* Driver Stares and Fireman Hall of Fratton shed were in charge, and when I joined them at Portsmouth Harbour the former did not seem very happy about things. Almost his first words to me were, "I'm afraid we're not going to do too well." He told me that, in addition to all the regular speed restrictions, no less than four engineering slacks were in force, and I must admit that with such hindrances in store timekeeping seemed out of the question.

We were not due away for 20 minutes, but the time passed quickly. From its elevated position, high above the quayside, Portsmouth Harbour station commands an extensive outlook, and this particular morning I found it irresistibly fascinating. Over the roofs at the dockyard entrance the slender rigging of H.M.S. *"Victory"* rose almost alongside the massive forward tripod of H.M.S. *"Hood,"* and at the quay wall, berthed just astern of the giant battle-cruiser, was the Royal yacht *"Victoria and Albert."* The harbour was alive with ships of all kinds, and lying far up the water, seen against the grey chalk of Portsdown Hill, was the sinister outline of H.M.S. *"Rodney."* By now the S.R. paddle steamer *"Southsea"* was coming through the narrow entrance from Spithead, laden with returning holiday-makers from the Isle of Wight. She was quickly alongside, and soon hundreds of passengers were hurrying for the train. At 10.9 a.m., dead on time, we got the *"right away."*

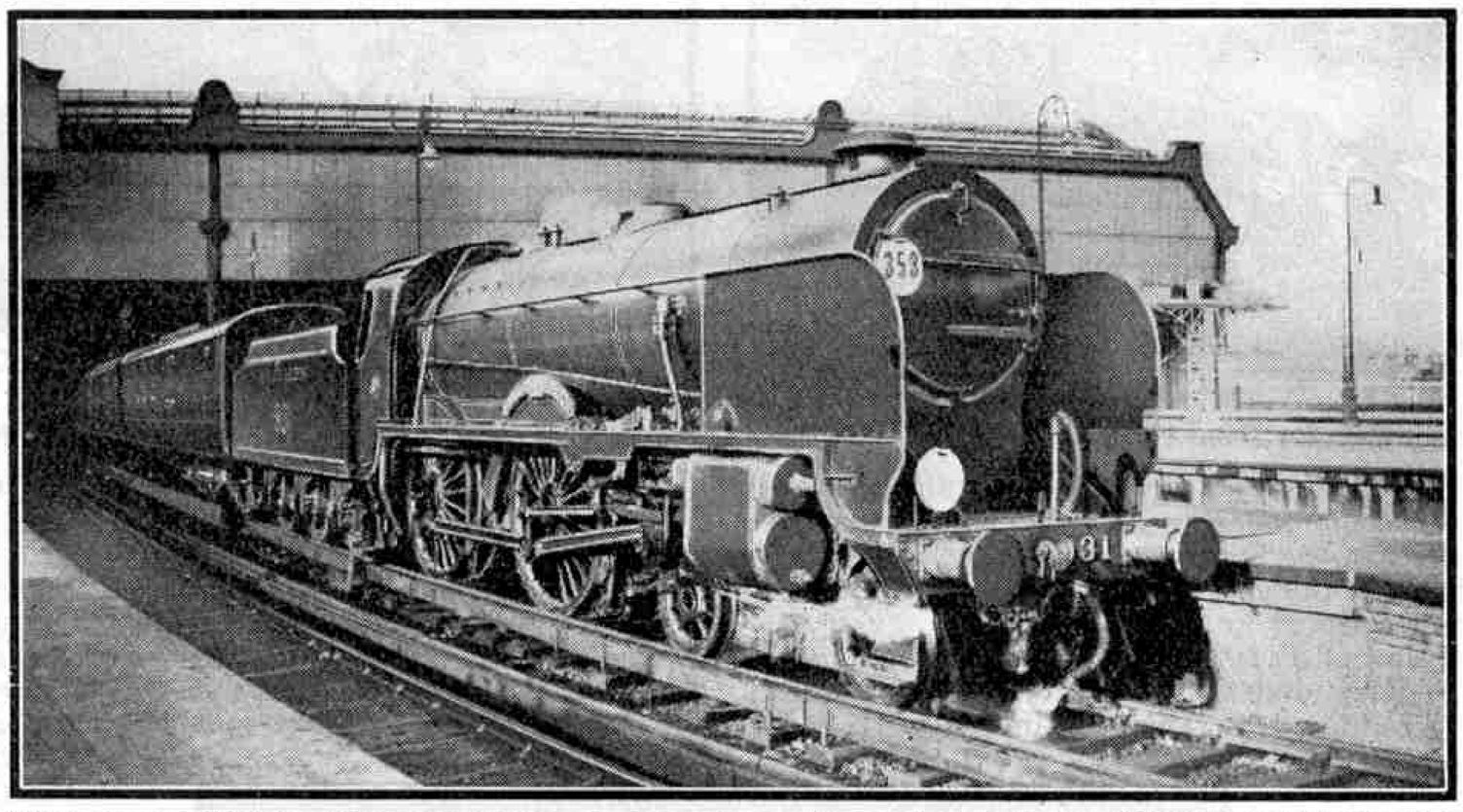
In response to the driver's skilful touch *"Cheltenham"* made a most impressive start. Sharply curving at first, the line rises at 1 in 87 out of the Harbour station, and then the grade eases to 1 in 245. On this awkward stretch we steadily gathered speed, and so reached the Town station, nine-tenths of a mile, in 3¾ minutes. A few minutes standing while many more passengers entrained, and then we were right away indeed, next stop Waterloo. From the moment of starting Driver Stares fixed the cut-off at 29 per cent., and so it remained all the way to London. Never before have I made a run on which no adjustment whatever has been made to the reversing gear; but a still more unusual feature, and one that is an astonishing tribute to the power of the "Schools," is that the driver never used anything but the first valve of the regulator. So that in the description that follows, when I write of regulator openings I am referring always to the first port; the main regulator was not once opened throughout the journey.

We got away from Portsmouth Town in great style and were through Fratton, 0.8 miles, in under two minutes; but then almost immediately came the first slack for permanent way repairs, a long slowing to 15 m.p.h. past Portsmouth aerodrome. We had scarcely regained any speed when Farlington Junction signals were sighted at danger; we crawled up, they just cleared in time, and then Bedhampton "distant" threatened us. Once more we scraped through without having to stop, and *"Cheltenham"* was put to it with some vigour; again it was of no avail, for there was a slow train just ahead, and Havant signals were "on." We crept towards the station, until at last the other train had got clear down the coast line; then we got the road. But by reason of these checks we had taken just over 14 minutes to pass Havant, 7.2 miles out, and were already 4½ minutes late.

Driver Stares now fully opened the first valve, and the engine picked up in magnificent style. From the coastal plain the line rises steeply to the crest of the South Downs near Buriton, and on grades varying between 1 in 150 and 1 in 120 *"Cheltenham"* worked up to 41 m.p.h. From the beautiful wooded country near Rowlands Castle we forged our way up among the hills; speed rose to as much as 45 m.p.h. near Idsworth Crossing, and then we came on to the heaviest part of the ascent—first a mile at 1 in 100, and then nearly two miles at 1 in 80 up a deep valley between Heald Down and West Harting Down. The engine was going grandly, and after the first mile we were still doing 40 m.p.h.; Stares shouted across: "We're alright; she'll do it on the first valve." And *"Cheltenham"* did indeed! After a bank almost as steep as Shap, we came over the top at

25 m.p.h.; but in spite of this splendid climbing we had taken 28 minutes to pass the summit, only 15.6 miles out of Portsmouth.

Buriton however saw the end of slow travelling. In the short tunnel just beyond the crest of the bank Stares brought the regulator back to three-fifths, and the engine dashed away down the falling gradient at such a pace that barely three minutes after leaving the tunnel we were flying through Petersfield at 75 m.p.h. Further acceleration was stayed a moment while we rushed a brief mile rising at 1 in 273, and then once more No. 925 raced away until, at the foot of the bank, near Stodham Crossing, she touched 84 m.p.h.



A Portsmouth express ready to leave Waterloo. The locomotive is "Schools" class No. 931, "King's-Wimbledon." Note the route-indicating discs, the upper one carrying the number of the particular duty on which the engine is engaged.

The climb over the North Downs begins at once; two miles at 1 in 80 checked but little the whirlwind stride of *"Cheltenham,"* and up Liss bank speed did not fall below 52½ m.p.h. Stares had no need to touch the regulator, and with the first valve still only three-fifths open we fairly stormed over the easier part of the climb, past Liphook, going 56 to 64 m.p.h. all the way. The last two miles up to Haslemere summit are at 1 in 100; the western slopes of Hindhead lay on our left, speed began to fall off, but within a mile of the top we were still doing 56 m.p.h. Haslemere station was passed at 50, and we breasted the summit just beyond at 48½ m.p.h.—a really wonderful performance. Over the complete nine miles of ascent, four of which are at 1 in 100, or steeper, we had averaged exactly 60 miles per hour.

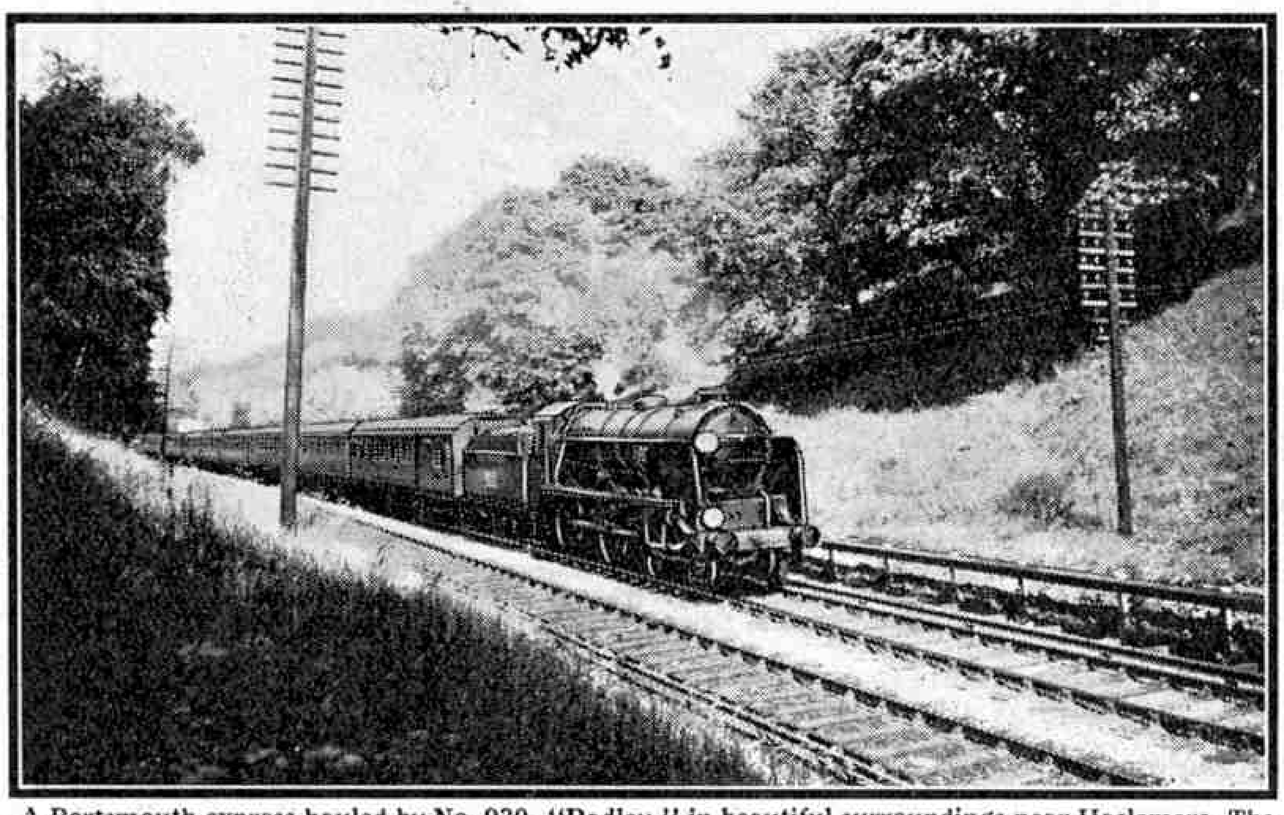
Although the regulator was now practically closed, we began the descent towards Guildford in dashing style; the track is winding, however, and several slight touches of the brake were necessary to keep the speed from rising too high. *"Cheltenham"* was a fine riding engine, and although she bucked a certain amount on reverse curves, her motion was as nothing compared to the fiery behaviour of, say, a Great Northern "Atlantic" at speed. We galloped merrily downhill at 70 m.p.h. in the shadow of the Surrey Highlands.

Farther down the bank we got up to 74 m.p.h., but our gay progress was brought to an end approaching Witley, where a 30 m.p.h. slack was in force on account of drainage work under the track. Directly we were over the site Stares opened the first valve fully, and in two miles *"Cheltenham"* had accellerated from 30 to 65 m.p.h.! Further caution was needed through Godalming, however, where the railway winds in serpentine fashion through a narrow glen between the hills. Speed was eased to just under 60 m.p.h., and I had to hang on tight while *"Cheltenham"* bucketed round the curves; but once through Farncombe we went ahead again. Near Peasmarsh Junction another out-of-course slowing was necessary, over a lengthy stretch where relaying was in progress; and instead of doing 70 or so, we ran cautiously at 15 m.p.h. alongside the lush meadows of the Wey valley.

We had scarcely recovered any speed from the slack when the signals of Guildford threatened us, but after running very cautiously through the long tunnel we got a clear road once more and passed through the station in 57¼ minutes from Portsmouth, 43.3 miles. In spite of the checks at Witley and Peasmarsh we were only 2¼ minutes late. With the first regulator full open we now got away in great style; Worplesdon was passed at 66 m.p.h., and although Woking Junction "distant" was at danger when first sighted it was almost immediately pulled off, and after a careful slowing to 30 m.p.h. round the curve on to the main line, we went ahead in more brilliant style than ever.

Stares did not open out beyond three-quarter regulator, and yet over the gentle ups and downs of the main line the engine developed some really astonishing speed. Less than three miles beyond Woking Junction we were doing 67, and a moment later were tearing past Brooklands race track at 71½ m.p.h. The rise past Weybridge into Oatlands cutting was taken just as though it did not exist; and beyond Walton, on a grade no steeper than 1 in 529, *"Cheltenham"* reached the truly thrilling rate of 77 m.p.h. With such a load as 395 tons this would have been good going for a "Pacific," let alone a 4–4–0! So we passed Hampton Court Junction, 60.3 miles from Portsmouth, in 74¾ minutes, only a little over a minute late.

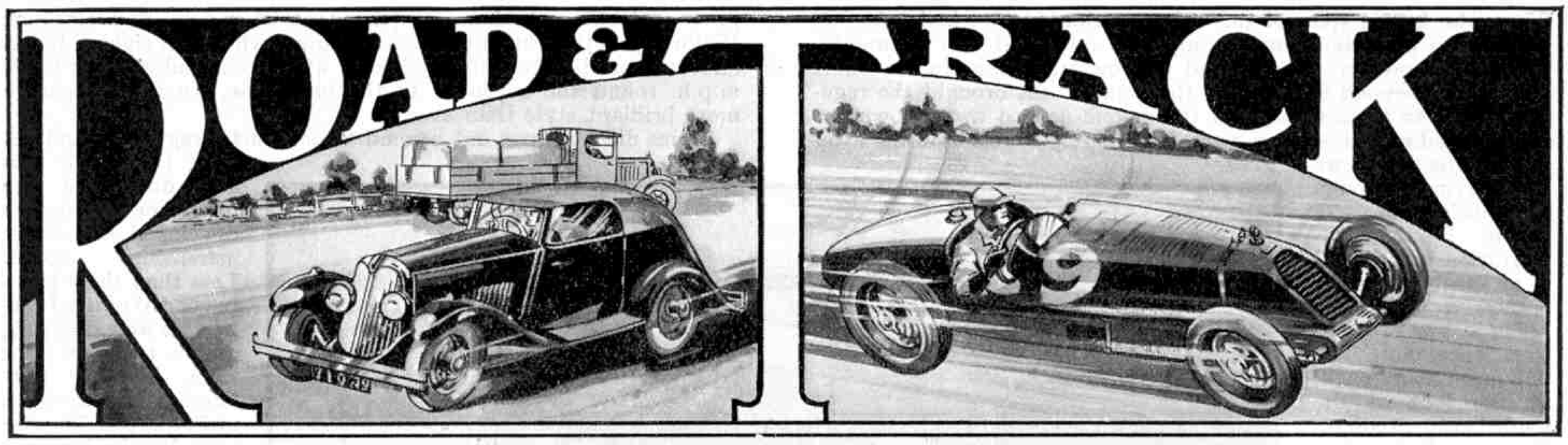
Sweeping up the rise at 1 in 378 past Surbiton without going below 71 m.p.h., we were running at 72½ m.p.h. on the dead level beyond when the last of the engineering slacks was encountered, a slowing to 20 m.p.h. at the west end of Malden station. But from this check we picked up so brilliantly that, reading my watch approaching Clapham Junction, I wondered whether even yet we might not just scrape into Waterloo on time. From the Malden check we had passed Wimbledon at 53 m.p.h., Earlsfield at 62, and were through Clapham Junction, 69.7 miles from the start, in just 85 minutes. With no further checks we could easily have finished in 91 minutes, or perhaps a trifle less, but as we swung into the straight, colour light signals ahead showed successively double-yellow, single yellow, and red. Stares drew up very slowly, but we were brought to a dead stand at Queens Road, 71 miles from Portsmouth in 87¼ minutes.



A Portsmouth express hauled by No. 930, "Radley," in beautiful surroundings near Haslemere. The conductor rail for electric traction, to be inaugurated this month, can be seen alongside the running rail.

At the very instant we stopped the signal cleared. We were not at rest for more than 5 seconds, and then we got away in good style, leaving Nine Elms goods yard on the left and rising high above the house tops towards Vauxhall. The Thames was now close at hand, and across the water were the Houses of Parliament; we neared the terminus. At the time of my trip the vast scheme of resignalling, with colour light signals, that has so completely revolutionised traffic working in the approaches to Waterloo, was not complete, and within half a mile of journey's end we were yet again brought down to walking pace by adverse signals. However, a second dead stop was just avoided, and passing slowly under the great "A" signal box that used to span nearly all the approach tracks, we stopped at Waterloo in 93¾ minutes from Portsmouth.

By this magnificent running Stares had actually gained nearly a minute on booked time between Havant and Waterloo, in spite of three permanent way checks, one dead stand, and two other delays from adverse signals. In fact the net time for the 73.6 mile run works out at 82 minutes—a remarkable average of 54 m.p.h. It is fortunate to be able to set on record so peerless an example of "Schools" performance; it forms indeed a wonderful farewell to steam on the Portsmouth line.



A Sleeper Bus for Desert Service

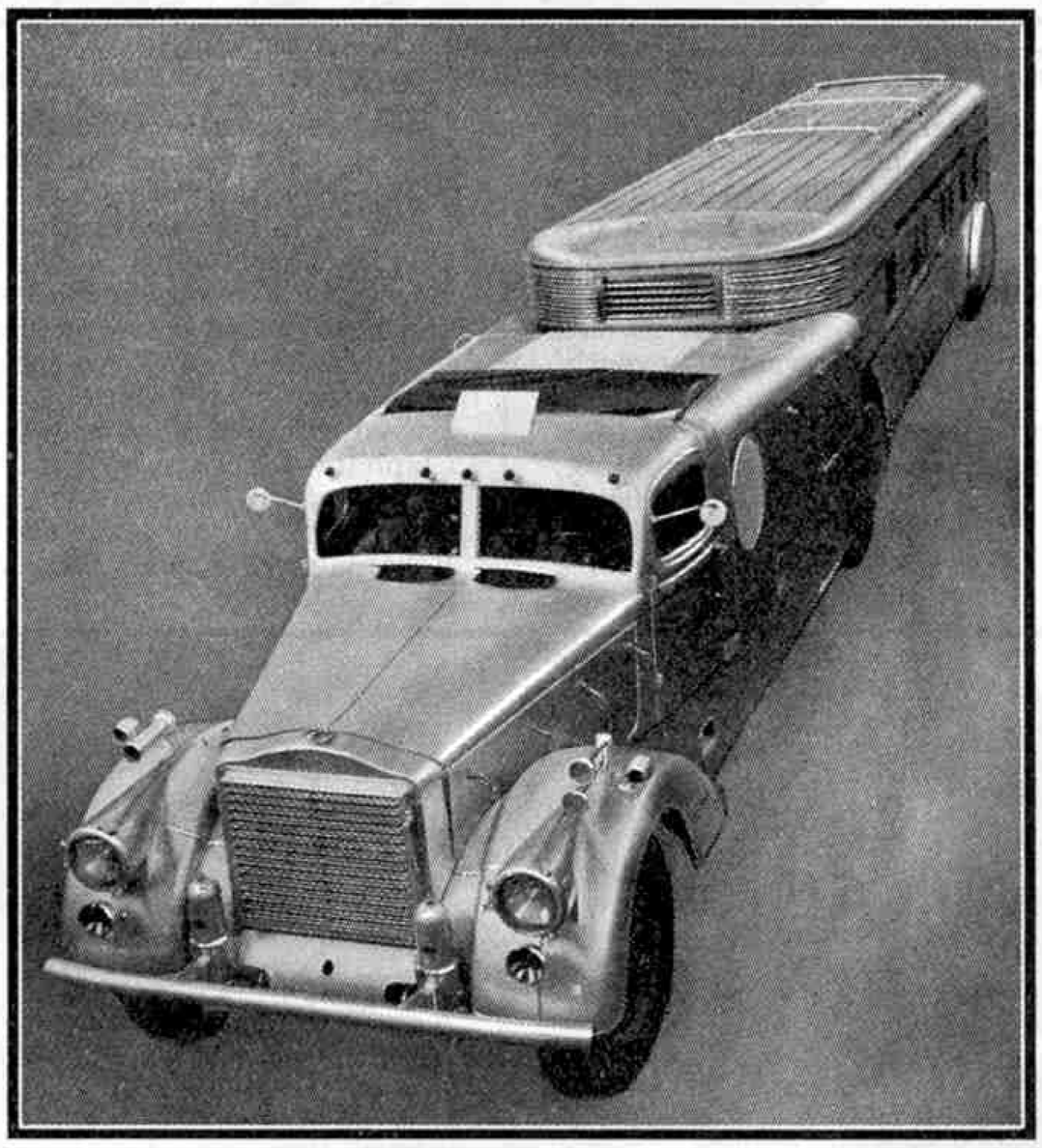
The illustration on this page shows a light weight, stainless steel sleeper bus, capable of accommodating 14 passengers, that is designed specially for travel in the Syrian desert between Baghdad and Damascus. It was built by the Edward G. Budd Manufacturing Company for the Nairn Transport Company Ltd.

The sleeper unit is the first of its type ever constructed, and was specially designed to operate under the extreme temperatures and road conditions encountered in this 600-mile desert run, only 200 miles of which is over properly made roads.

The overall length of the trailer and tractor is 57 ft. 6 in. and that of the trailer alone 36 ft. 8 in. The overall height of the bus when loaded is 8 ft. 7 in. The trailer is hauled by a 150 h.p. Diesel tractor and the vehicle has a top speed of 65 miles an hour. Because of the sand storms prevalent on the route the bus has to follow in service, all joints in the bodywork are soldered, cemented, or painted and thoroughly water-tested so that they cannot possibly leak or let in dust.

The inside walls of the body are made of $\frac{1}{4}$ in. birch plywood, screwed and cemented to the battens, and between the side lining and the outer sheathing, there is a 3 in. layer of insulation material covered with muslin. Air conditioning apparatus is provided to reduce the extremely high temperatures during the daytime, and heaters will keep the interior warm during the night. The stainless steel roof and sides form a reflecting surface with the lowest possible heat absorption.

Individual air-conditioning ducts run to the berths and supply about 50 cu. ft. per min. of air to each. Ample space is provided for each passenger, and every compartment, although large enough to seat four, is designed to accommodate two persons. Iced drinks will be available for passengers at all times.



A 14-passenger stainless steel trailer coach designed for crossing the Syrian Desert between Baghdad and Damascus. Novel features of the vehicle are described on this page. Photograph by courtesy of Edward G. Budd Manufacturing Co., Philadelphia.

A Flying Motor Car

A motor car that can travel at 100 m.p.h. in the air and at 70 m.p.h. on the road has made its appearance in America. It has detachable swept-back wings fitted with rudders and stabilising fins at the tips, and is provided with a six-cylinder Studebaker motor car engine, which drives a pusher propeller behind the cabin by means of belts. The radiator is placed in front of the fuselage in a similar position to that of a motor car. The undercarriage consists of one wheel in front of the centre of gravity and two wheels behind it. This enables the machine to land in a very short space, as brakes can be applied hard on the two wheels and the machine is prevented from pitching on to its nose by the single wheel in front which is used also for steering on the ground.

The wings can be attached or detached by a simple arrangement, and the engine drive can be transferred from the wheels to the propeller by means of a clutch.

Transporting London's Millions

According to statistics recently published only 20 horse-drawn cabs now remain in London. They are the survivors of nearly 10,000 vehicles of this kind that plied for hire in the city 50 years ago. Their place has been taken by 8,180 taxi-cabs. It is estimated that 56 years ago there were 100,000 carriages and pairs, broughams, dog carts, and hackneys. To-day these are replaced by 426,000 motor cars, 121,000 motor cycles and 2,000,000 pedal cycles.

In 1881 the passengers carried by all means of public transport in London were estimated to number 390,000,000, and of this total the railways carried two-thirds. In 1935 the number of passengers carried by all means of public conveyance in London reached the astonishing total of 3,995,000,000, or 10 times the number carried 50 years ago. Half of this total was carried by omnibuses, and the remaining half was divided almost equally between the tramways and the railways.

More Records for Diesel-Engined Cars

To the world's land speed records standing to the credit of British drivers and cars have now been added those obtained by Capt. George Eyston at Montlhéry with his streamline Diesel-engined car *"Black Magic."* Capt. Eyston succeeded in setting up records for a car of this type for one, 12 and 24 hours, 50 and 1,000 kilometres and 1,000 miles. His speeds for one, 12 and 24 hours were 105.59, 99.03 and 97.05 m.p.h. respectively. During the attack on the 24-hour record the car covered 1,000 kilometres at an average of 98.51 m.p.h. and 1,000 miles at an average of 99.10 m.p.h., and the total distance covered in the run was 2,329 miles, which is greater than the distance from London to Newfoundland. Eyston's record for 50 kilometres is 106.27 m.p.h.

The engine used in the *"Black Magic"* is similar to those fitted in A.E.C. Diesel buses, coaches and railcars, and is installed in a chassis fitted with a special streamline body. During the long distance attempt the headlights were carried close together in front of the radiator, and the fuel cost for the run was only seven shillings for each 100 miles covered.

Motor Vehicles in Great Britain

There are more passenger and commercial motor cars in Great Britain to each square mile of area than in any other country in the world. For every square mile in Great Britain there are 22 motor vehicles. Belgium is next with 13.5 cars per square mile, then the Netherlands with 10.7 and France with 10.2. Out of every 100 motor vehicles sold in Great Britain, 94 are British made. Out of a world total of about nearly 40,000,000 motor vehicles the United States of America has about three quarters, the remaining quarter being distributed mainly among Great Britain, France, Canada, Germany, Australia and Italy.

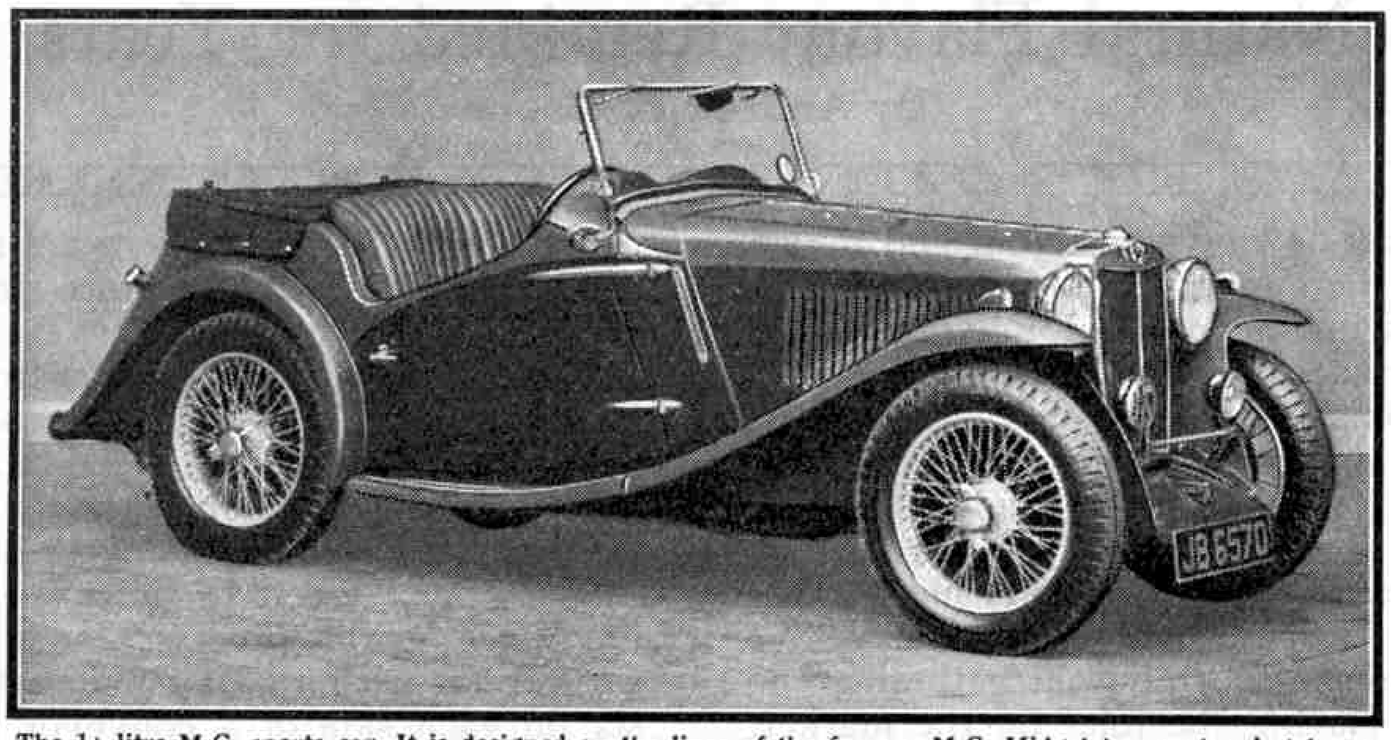
Excitement at Crystal Palace

In the Coronation Trophy Race, with which the fine new road circuit at the Crystal Palace was opened, an enormous crowd of over 30,000 people witnessed a thrilling victory for E.R.A. cars. The race was run in two heats and a final. In the first heat Pat Fairfield soon established a lead with his E.R.A. and was never seriously challenged. D. H. Scribbans in another E.R.A. was lying second when the exhaust pipe of his machine came adrift. Hurriedly tying his handkerchief around the hot pipe, he endeavoured to continue, falling right back to last place as a result. He continued driving with one hand, holding the exhaust pipe bracket with the other, but even this plucky effort did not enable him to qualify for the final.

The second heat ended in a close finish between two E.R.A. cars driven by Raymond Mays and A. C. Dobson respectively, Mays winning by about 10 yds. The first thrill was when a Bugatti driven by Esson-Scott skidded and shot backwards over the banking on to the ground below.

During the third lap part of the carburetter of one of the cars came adrift, bounced on the road and went straight through the oil tank. Up went a cloud of dust and splinters and the machine swung right round before coming to rest badly battered. Fortunately no one was hurt.

The final was a very exciting race with Mays, Fairfield and Dobson in the front places. Unfortunately the brakes of May's machine failed during the seventh lap and he had to retire. Fairfield maintained the lead and won at an average speed of 53.77 m.p.h., Dobson being second and R. Hanson in a Maserati third.



The 1½ litre M.G. sports car. It is designed on the lines of the famous M.G. Midget two-seater, but has a more powerful engine and accommodation for four people. Photograph by courtesy of Morris Motors Ltd.

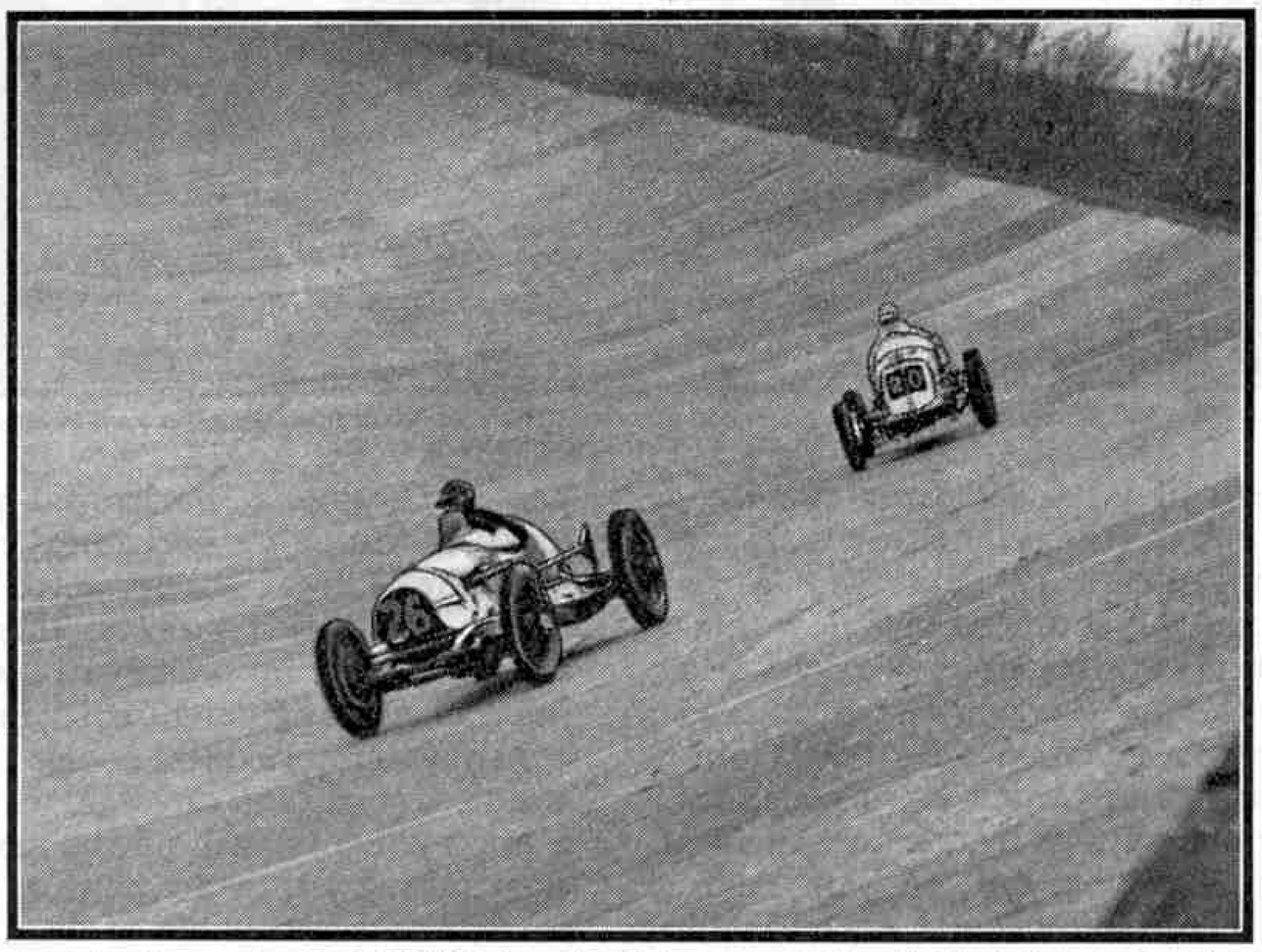
E.R.A. Again Triumph in I.O.M. Race

A further wonderful display by E.R.A. cars was given in the R.A.C. International Car Race at Douglas, Isle of Man. The E.R.A. team obtained all the first five places, and inflicted a smashing defeat on their Maserati rivals.

Five Maserati machines were entered, but two of them had to retire and the others did not complete the course in the time necessary to be regarded as finishers.

Prince Birabongse of Siam, better known as "B. Bira," drove the winning E.R.A. and completed the course in 2 hr. 45 min. 34 sec., at an average speed of 70.69 m.p.h. He was followed 42 seconds later by R. Mays. Then came Pat Fairfield, R. E. Tongue and P. N. Whitehead in that order.

The race was run in a downpour of rain and although the roads were slippery and skidding frequent, no accidents occurred.



An exciting moment during the 1936 International Trophy race at Brooklands. A single-seater Riley driven by H. G. Dobbs, with an E.R.A. in hot pursuit, coming off the banking into the finishing straight. Dobbs finished third. Photograph by courtesy of Riley Record Ltd., Coventry.

Records Broken in Tripoli Grand Prix

This year's Tripoli Grand Prix was one of the most exciting races ever witnessed on the Continent. Right from the start there was a tremendous fight between Mercedes and Auto-Union cars. Caracciola in a Mercedes first led the field, with Auto-Unions driven by Stuck and Rosemeyer tearing along at terrific speeds close behind. The pace was so hot that the tyres could not stand up to the strain, and almost every lap the leadership changed as one car after another had to visit the pits with tyre trouble. The Auto-Union team alone changed 35 wheels.

One of the Auto-Unions, that driven by Stuck, put up a record lap for the course of 142.41 m.p.h., and even the slowest cars tore round the circuit at speeds approaching 136 m.p.h.!

The race was won by Lang in a Mercedes, the second car, Rosemeyer's Auto-Union, crossing the line only 10 sec. behind. An Auto-Union driven by Von Delius was third and Stuck's Auto-Union fourth. The winner's average speed of 134.4 m.p.h. was a record for this race.

The race for cars not exceeding 1,500 c.c. capacity was won by a Delahaye driven by Dreyfus, whose average speed was 107.58 m.p.h.

Tourist Trophy Race to be Run at Donington

The 1937 R.A.C. Tourist Trophy Race, is to be run on the Donington circuit on September 4th. In previous years this race has been run over the famous Ards Circuit at Belfast.

To meet the requirements of the race the Donington circuit is being extended by about a mile at Starkey's Corner, so as to continue the straight and facilitate overtaking. The length of the race may have to be reduced, but its character will be essentially the same as when it was run over the Ards Circuit.

French Grand Prix

A number of interesting changes have been made in the arrangements for this year's French Grand Prix. Last year the race was over a distance of a 1,000 kilometres, cars in the various classes running simultaneously in one event. This year a separate race for cars of 1,500 c.c. capacity will be run before the Grand Prix proper, and for these cars the distance has been cut down to 300 kilometres. Once the tanks of the cars have been filled they will be sealed and no refuelling will be allowed.

A New Non-Skid Safety Tyre

Secret tests running to more than 500,000 tyre miles have been made of a new Dunlop safety tyre by a special fleet of cars on roads of all kinds. The new tyre is generally similar to the Dunlop Fort "90," but there is an important addition in the form of six rows of teeth or serrations three on each side, and the studs also have slots across them. The serrations gi ve the tyre a greater effective length of edge against both forward and sideways skidding, and thus improve road grip. The slots are designed to preserve the anti-skid features of the tyre even when the tread is well worn, and to avoid rapid or irregular wear. The casing also has been improved as a result of the firm's experience with their giant tyres, which are particularly subject to heavy usage.

The new tyre is attractive in appearance, for it is finished in a semi-matt even black surface, with a medallion on it in gold.

A New Record for Shelsey Hill Climb

Raymond Mays has set up a new record for the famous Shelsey Walsh Hill Climb. Driving the 1½ litre E.R.A., with which only 48 hours previously he had won second place in the R.A.C. International Car Race in the Isle of Man, he made a magnificent climb in 39.09 seconds. The previous record time for the climb was 39.6 seconds.

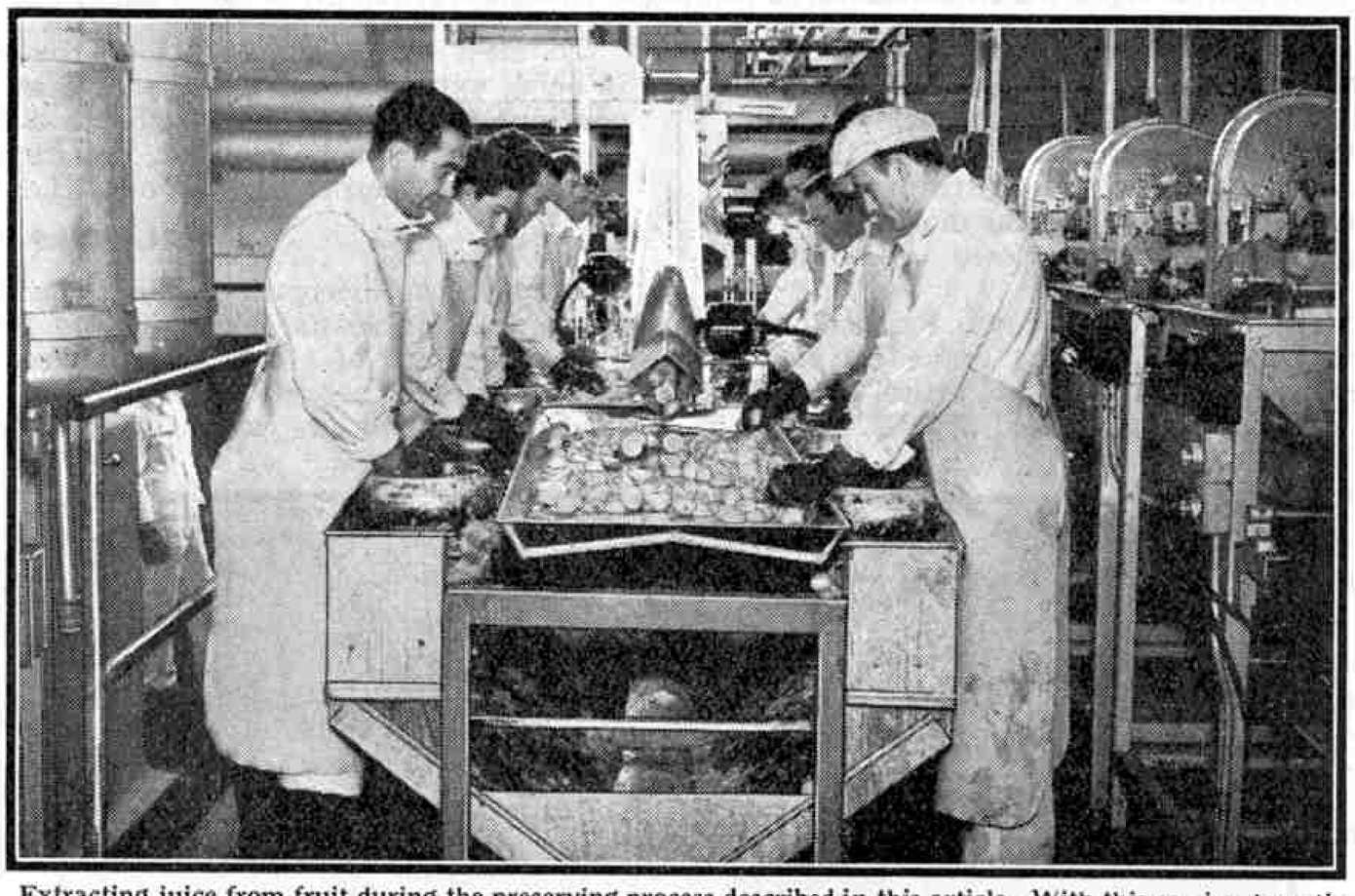
Freezing Fruit Juice to Preserve it

Natural Flavour Retained for Years

By Andrew R. Boone

FRESH fruit juices can now be pressed out and tinned without cooking or the application of heat, and then not only retain their original flavour and full vitamin and food values, but also remain in first class condition for several years. This astonishing achievement has been the goal of scientists and packers for more than a half-century, and has been reached as the result of several years of careful study and experiment in Los Angeles laboratories. The process used is now a fully mechanised one in which very low temperatures play an important part, and there is absolute control from gathering the fruit from the tree to placing the juice on the market.

Officials of the California Consumers Corporation, the organisation responsible for the new process, believe that it is the first step towards a new era of progress in food packing. Its outstanding feature is its speed. No chance is given for deterioration to set in, and all the vital values of the products are held in suspension until the juice is taken from the tin for human consumption. The juices indeed are completely processed and made ready for shipment on the day the fruit is picked from the tree, the entire movement through the plant used taking not more than forty-five minutes.



Extracting juice from fruit during the preserving process described in this article. With this semi-automatic juicer 12 men extract 900 gallons of juice daily.

The process depends upon the action of very low temperatures for its efficacy in preventing deterioration. As a result the natural taste of the juices is not destroyed, and their health giving and nutritive elements also are retained. As a test juices prepared and tinned in this manner have been used in certain institutions in the Los Angeles district and on steamships plying out of San Pedro Harbour. The reports on them have been so enthusiastic that the Corporation is now making plans for production on a large scale, and for the sale of its products in the United States and Canada and indeed throughout the civilised world.

The method so far has been applied successfully to the citrus fruits, that is lemons, oranges and grapefruit. The fruit is first packed in regulation wooden citrus crates, and pre-cooled in refrigerated storage at a temperature of about 35 deg. F. for a few hours. The boxes are next carried on trucks to a continuous belt conveyor, on which they are placed to be carried toward the main treatment room. All the machinery and pipe lines that come in contact with the fruit juices are made of stainless steel, and at no place on the processing journey is the fruit touched by human hands.

The fruit is washed by water from a nozzle directed on it as it passes, and is then automatically graded into two sizes. From the grader it is fed to a chain elevator, which raises it into a semi-hopper, and there it is cut into halves mechanically before passing on a belt conveyor to the "juicing line," where the juice is extracted. Two methods are in use for this process. One is semi-automatic, and is carried out with a battery consisting of 12 juicer heads, six on each side of a conveyor belt, with electrically-operated rotary type juicers. The capacity of this line is 75 gal. of juice per man per day.

The second method is automatic, and is an interesting new development. The halved fruit is placed in slit rubber cups attached to a continuous metal belt, and comes into contact with revolving juicer heads set in cylindrical drums. Thus the juicer removes the juice from the fruit "on the run," so to speak.

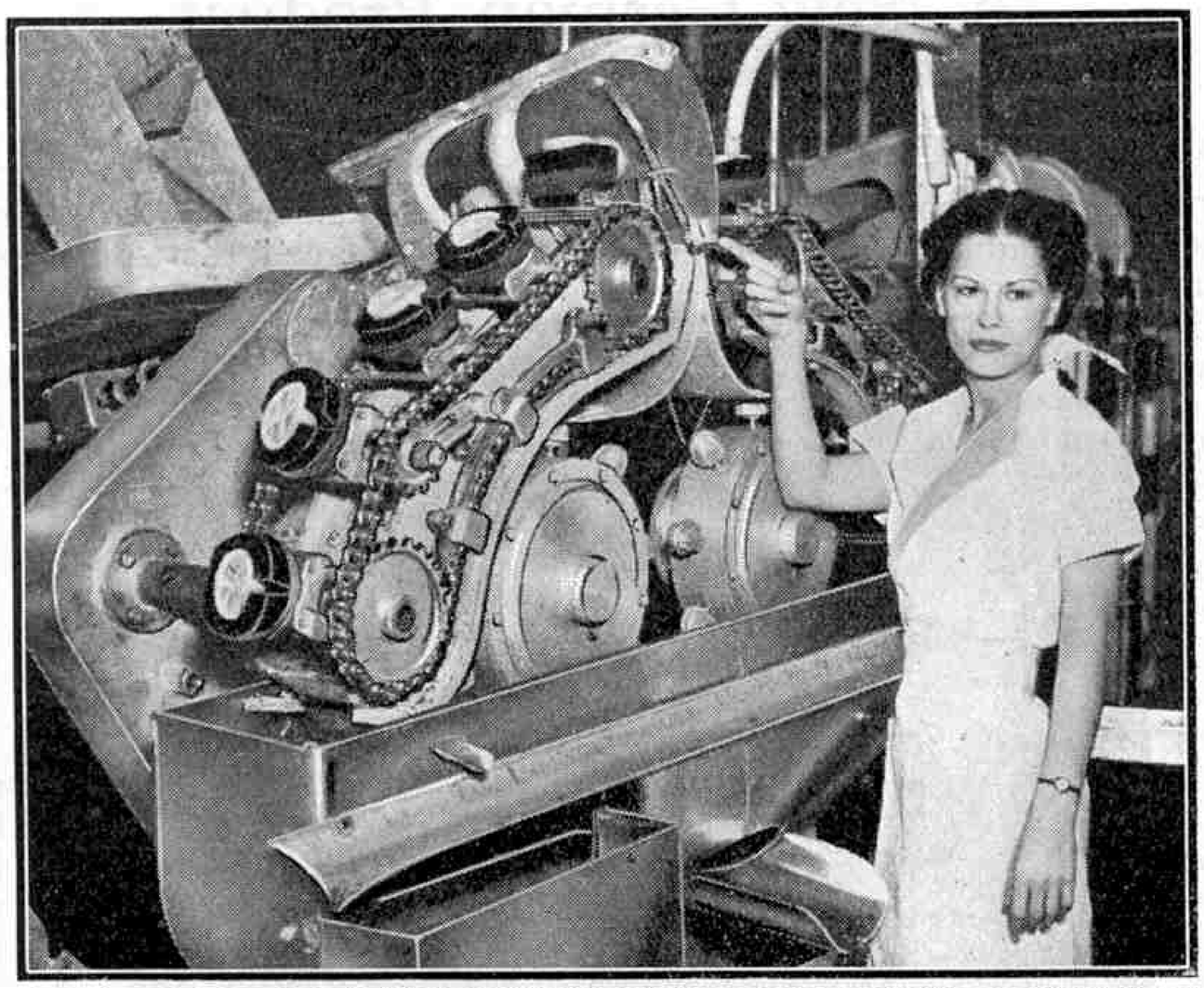
A pump takes up the juice after it has passed through a horizontal paddle-type strainer, and forces it through a horizontal cooler in which it is chilled to about 35 deg. F. above zero. Nothing is added to any of the juices in this process; there is no thinning, and no concentrating, no preservatives are used and the original juice is not tampered with in any way.

From the horizontal cooler the juice is pumped into a stainless steel tank of 75 gal. capacity, where it is held for a few moments, still at the same low temperature. It is then released to a de-aerator, which removes excess air from it and is capable of dealing with 300 gal. of liquid an hour. The juice again enters a pump line, going to the canning machines, which are fed with tins from a sterilizer that keeps them free from contamination of any sort until ready for use. The tins are filled on sanitary capping machines by a vacuum process at the rate of 2,500 gallons per day.

The sealed tins are lifted by a metal chain-type elevator to the loading platform of what is known as a Finnegan tube, in which their contents are frozen to a temperature of about 50 deg. F. below zero. The Finnegan tube uses alcohol brine for cooling, and only takes 15 min. to reduce the temperature of a tin from 35 deg. to the

very low temperature required.

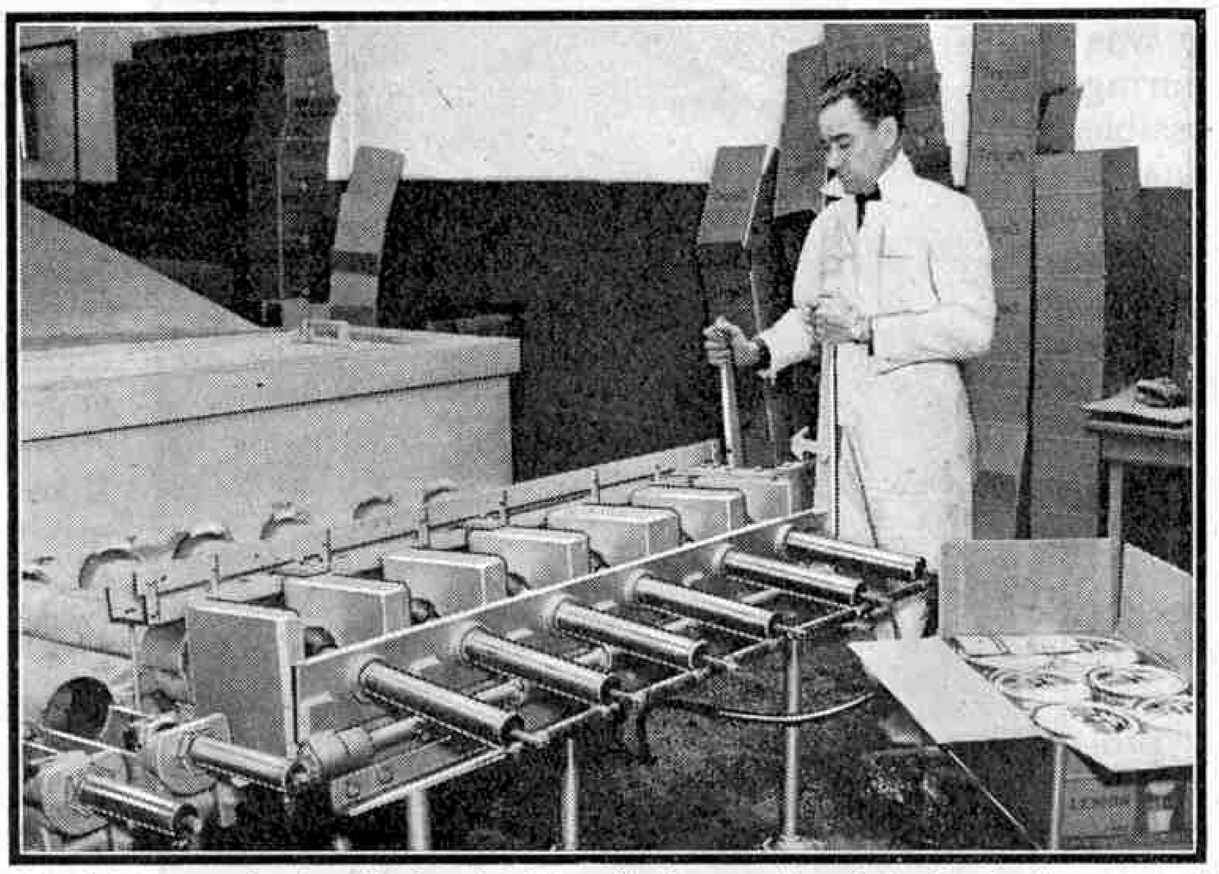
The tins are "harvested" at the end of the freezing chutes by means of a unique device that permits each to be removed from the line without the operator having to work against the weight of the entire chuteful behind it. Each Finnegan tube has a capacity, at full load, of 67 or 47 tins according to size. The tins flow down the cooling tubes, which are arranged in long sloping rows, and emerge somewhat off centre, remaining locked in line until released, when all the tins in each row move downward against a pneumatic cylinder, the purpose of which is to halt the procession with as little jarring as possible. Six tins are set free at each operation of the releasing lever.



An automatic juicer at work. The halved fruit is seized in rubber jaws, revolved at high speed and pressed against whirling heads on drums below it.

The tins are enamelled rather than labelled, on account of the unusual temperature conditions to which ordinary labels would be subjected. The capacity of this quick freezing apparatus is 6,000 three-quart tins in each period of 24 hrs. continuous operation. From the time the fruit begins its progress along the line until it emerges in tins ready for shipment or consumption, the entire process with this plant requires about 200 h.p.

The tins of hard-frozen juice can be despatched reasonable distances, for instance on lorries to docks and railway goods stations, without refrigeration. On arrival they are still frozen, with their contents intact and not subject to any deterioration. Fibre cartons are used for packing, as they are excellent heat insulators. It is claimed that the juices can be kept in stores in refrigerators, much as ice cream is held and sold as needed to customers. The contents of the tins are returned to normal liquid state simply by standing them in cool water, or allowing them to remain at room temperature. It is not advised to hasten liquefaction from the solid condition by steaming the tin or placing it in hot water.



Tinned fruit emerging from the freezing tubes. Six tins are released at a time by the movement of a lever, and are removed for storage or shipment.

The production manager for the California Consumers Corporation explained that "scientific tests carried over long periods of time by the national government have demonstrated beyond doubt that deterioration of citrus fruits begins, at least in a small way, almost from the moment the fruit is picked from the tree.

"Of course this deteriorating action is almost negligible the first day or two, but thereafter progresses more rapidly. Our new cold process gets the fruit before any appreciable losses of any kind set in, either in food value, vitamin content, or flavour; all these essential values are held in suspension until ready for use. We have tested citrus juices, packed in this new manner, for years after preparation, and the contents have not demonstrated any detectable losses of any kind. In fact the process is so perfected that after months and even years of holding under refrigeration, this juice is still a better product from every standpoint than much of the juice freshly expressed before the eyes of the consumer at restaurants, in the home, or elsewhere. The reason for this statement is that oranges, lemons and grapefruit are usually weeks old before being used, and losses have already been started."

By this new refrigeration method it is now possible for the first time in history for the lover of citrus juices, no matter where he is as long as transportation and a fair degree of refrigeration are available, to drink it undisturbed, as if the fruit from which it was made had just left the grove where it was grown. It would even be possible for an explorer spending a long winter in Polar regions to have fresh juice of this sort served daily, and actually to have it fresher and more invigorating than that consumed by many who are within walking distance of the groves in which the fruit is picked.

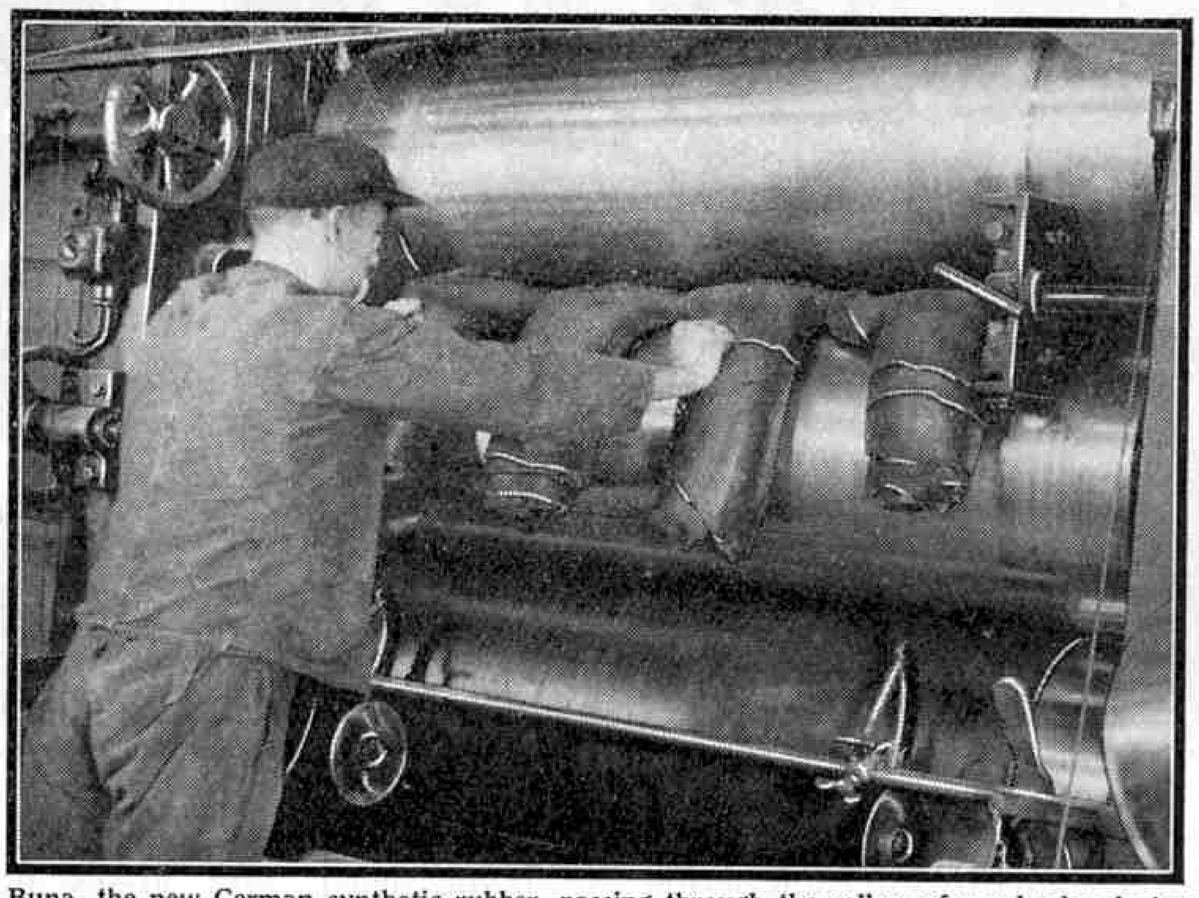
The success of the method is a triumph for refrigerating engineers and scientists. The process can be carried out at a reasonable cost, and now that it has been well tested and has proved so satisfactory, there seems no reason why the fresh fruit juice it yields should not eventually be available practically everywhere on demand. No difficulty should be experienced in keeping the tins at the low temperatures desirable, for even in transit it can be cooled in the refrigerated wagons now used, and cold storage is available in every centre of the population. Thus the juice should always reach the consumer in perfect condition.

Synthetic Rubber from Chalk and Coal

A New German Product

By H. F. Kutschbach

ONE of the greatest romances of modern commerce has been the rise of the rubber industry. It is not very many years since rubber was purely a wild natural product, obtained only from a tree that grew in the forests of Brazil. A cargo of seeds smuggled out of the country in 1875 by Sir Henry Wickham was the beginning of the modern rubber industry, for young plants grown from these seeds were taken to Ceylon, and from there distributed to Malaya, where to-day there are immense plantations in which the rubber-producing tree is cultivated.

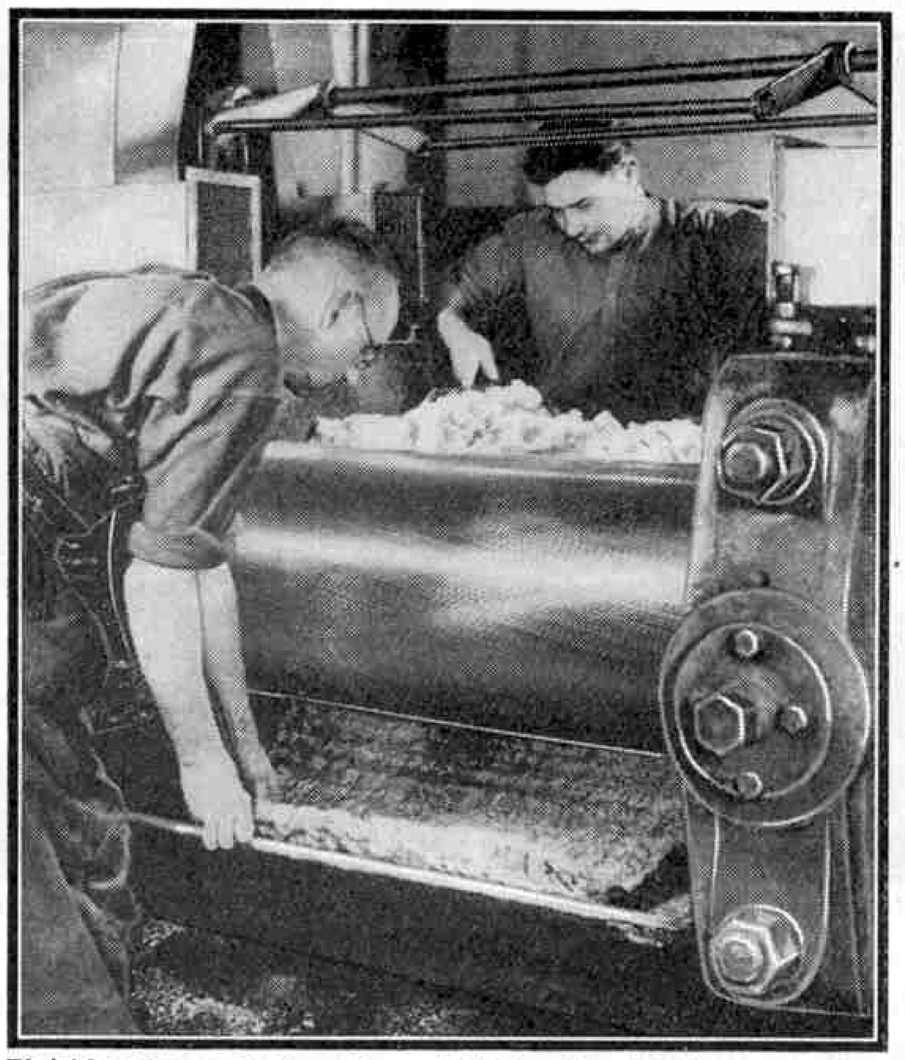


Buna, the new German synthetic rubber, passing through the rollers of a calendar during the making of a belt for use in a conveyor.

In view of the importance of rubber it is scarcely surprising that the chemist has turned his attention to this material in the hope of being able to produce it artificially from some cheap and convenient source. Many rubber substitutes have been produced, but none of these has been commercially successful. For instance, a form of synthetic rubber was manufactured in Germany during the War, when it was impossible to import rubber, but was unable to compete with the natural product when this again became available. Ceaseless efforts have since been made in that country to produce a really satisfactory substitute for the natural product, however, and it is now believed that these have been successful.

The new material is called "Buna," and it is said to be superior in many respects to ordinary rubber. The basic materials required for its production are chalk and coal, which are heated in an electric arc furnace at a temperature estimated to reach 3,000 deg. C. The process yields calcium carbide, and the gas obtained by treating this with water is the starting point of the actual production of rubber. The nature of the product depends upon the particular process employed, and there are several synthetic rubbers grouped under the name of Buna, each with special qualities, fitting it for particular purposes among the varied uses now made of rubber.

It is claimed that Buna remains fresh longer than natural rubber, which ages more quickly under the influence of light and of the oxygen in the atmosphere, or from mechanical strain arising from constant use. The synthetic rubber also is said to withstand the effect of heat better. This feature is of very great importance in connection with many uses of rubber. For instance, motor car tyres become hot in use, and the rise in temperature is greater at higher speeds. The greater the speed of a car, therefore, the more quickly its tyres wear out, and it seems as if the use of the new material will give longer life to them. This has been demonstrated in tests in which similar tyres of the same size, some made of natural rubber and others of the synthetic product, have been run over the same distance in exactly similar conditions. These trials were made on the motor race course known as the Nürburg Ring, where as many as 40 heavily loaded vehicles fitted with the tyres under test maintained an average speed of 31 m.p.h. while covering a daily distance of 375 miles. At the end of the trials the natural rubber tyres were more worn than those made of Buna. Their grooves and markings were more heavily affected, so that they were less able to check skidding, and generally they were in poor condition in comparison with the synthetic rubber tyres.



Finishing the synthetic rubber, which is claimed to be more resistant to heat and wear than ordinary rubber.

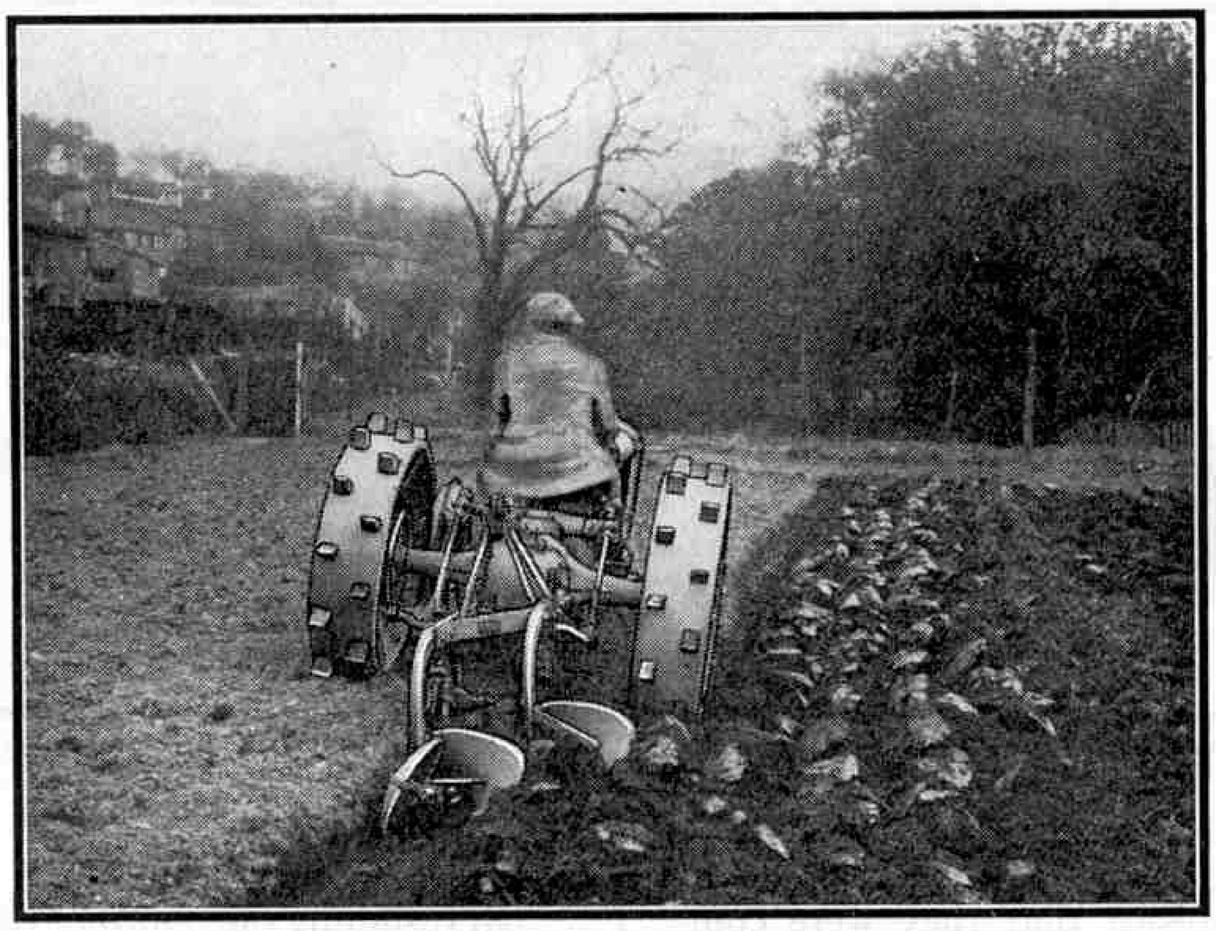
The construction has begun of a great factory at Merseburg, in which to produce the new synthetic rubber on a very large scale. The factory will be completed next year, and its output will be so enormous that it is expected to make Germany independent of supplies of natural rubber. It is interesting to realise that efforts of the same kind are being made in other countries, and in the United States there is a factory already at work producing synthetic rubber, for which similar claims are made.

The Ferguson Farm Tractor

Hydraulic Control for Implements

ONE of the most striking changes in agriculture in recent years has been the introduction of the tractor as a substitute for horses. At first the tractor was regarded as a tireless horse of greater power, but soon the engineer began to extend its uses, and among the many interesting developments he brought about was the introduction of unit construction and hydraulic control. The latter is incorporated in the Ferguson farm machinery, which is the outcome of experiments that have been carried on for more than 18 years. The advantages claimed for this machinery are that it will carry out a far greater number of operations than any tractor equipment previously produced.

The hydraulic principle employed in the Ferguson tractor is entirely new, and the machinery generally incorporates many interesting patented features. The implements are attached to the tractor by means of three links, of which the lower two draw the implement, while the top one is always in compression, enabling one implement to be dropped and another fitted in less than 30 seconds. The connection is direct, and the implement is close to the tractor, so that little space is required for turning on "headlands" at the ends of the furrows.



A Ferguson tractor hauling a double plough. A patent linkage and hydraulic control keep the plough level and at a constant depth in the soil. Photograph by courtesy of David Brown Tractors Ltd., Huddersfield.

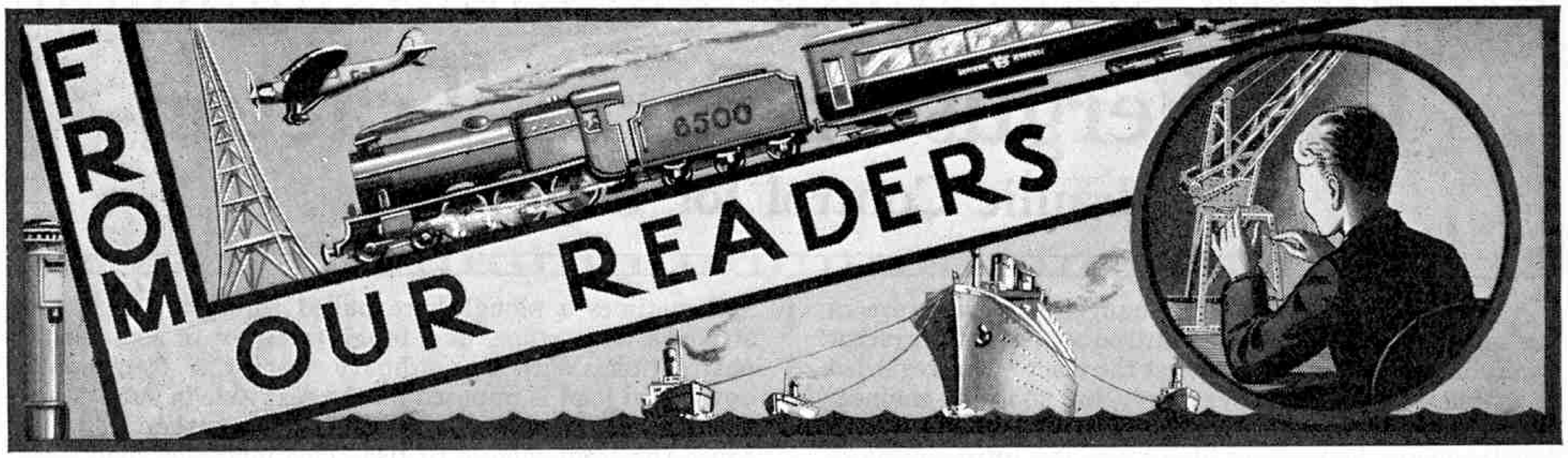
The most valuable feature of the Ferguson machinery is that it does not suffer from any of the drawbacks experienced with the normal type of tractor, to which implements are rigidly attached. The patented linkage and hydraulic control ensure this, for while they give flexibility to the implement laterally, the plough or cultivator in use is not merely dragged through the ground, but "floats" behind the tractor and is automatically kept at the correct depth, even when the wheels of the tractor drop into hollows or mount ridges. An oil pump driven off one of the shafts of the gear-box brings this about. The pump feeds oil to a piston working in a cylinder, and the movement of the piston raises or lowers the implement. The supply of oil is controlled by a valve operated by a handle placed near the seat occupied by the driver, who therefore can raise or lower the plough or cultivator in use. The depth of this is kept automatically at the correct setting during operation by a compensating lever, coupled to it and to a pivot on the rear axle casing of the tractor, which adjusts the valve in order to allow for differences in level and to keep the implement at the right depth in the soil.

Sometimes a ploughshare pulled through the ground strikes a large stone, or a tough tree root or some other obstruction. With an ordinary tractor a tremendous downward load is imposed on the rear axle in such cases, tending to bog the rear wheels into the ground and to cause the front wheels to rise. This increased load puts additional stress on the implement, which may lead to serious damage. With the Ferguson tractor only the rear wheels can rise. The pull of the tractor is then reduced and thus the implement is not injured in any way. Instead one of the driving wheels spins round harmlessly, owing to the action of the differential. The advantage when ploughing on hilly land is obvious.

Any obstruction of this kind is easily got over. The driver simply places the tractor in neutral, the implement is raised by the use of the lever controlling the oil supply, and the tractor reversed a foot or two, then put in forward gear, driven over the part where the obstruction is and the implement dropped back into work.

Another interesting feature is the means of tilting or levelling the implement used. As two of the tractor wheels run frequently in the furrow bottom with the other two wheels placed on the unploughed land, it is necessary to have a levelling screw where unit construction is employed. This is carried out very simply in the Ferguson by means of a small handle at the driver's right hand side. This raises or lowers one of the bottom links as required, thus adjusting the level very simply. Adjustments can be carried out while ploughing or other operations are in progress.

The implements used with the Ferguson farm tractor include the 10 in. plough shown in our illustration, together with cultivators and a ridger. The tractor itself is built on familiar lines. The rear axle and gear-box form a transmission housing that is cylindrical in shape and is of great strength, although light, for it is made of aluminium alloy. A four-cylinder Coventry Climax engine developing just under 20 h.p. at 1,400 r.p.m. is fitted. This is designed to start on petrol and to run on paraffin costing only 6d. per gal. The gear-box has three forward speeds and reverse, and the hydraulic pump is coupled to the layshaft, so that is only operates when the tractor is in motion. Steel wheels with spuds are provided as standard equipment, but giant pneumatic tyres can be fitted as extras.



These pages are reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

Colonel Lindbergh in Iraq

Colonel Charles Lindbergh, the famous American airman, accompanied by Mrs. Lindbergh, left England last February on an air tour of Europe and the Middle East in his special Miles "Hawk" aeroplane, which is capable of nearly 200 m.p.h. They reached the border of Iraq on 17th February at about 2.30 p.m., passing over Rutbah, a station in the desert, halfway between Damascus and Baghdad. At about 4.30 p.m., when they were within a short distance of Baghdad, they encountered a severe thunderstorm. Visibility was reduced to less than 200 yds., and they were unable to find the Baghdad airport, with the result that they were compelled to return to Rutbah, after making a detour of nearly 600 miles.



Colonel Lindbergh returning to his special Miles "Hawk" aeroplane at Basrah airport, after completing the necessary formalities. Photograph by A. Kouyoumdjian, Baghdad.

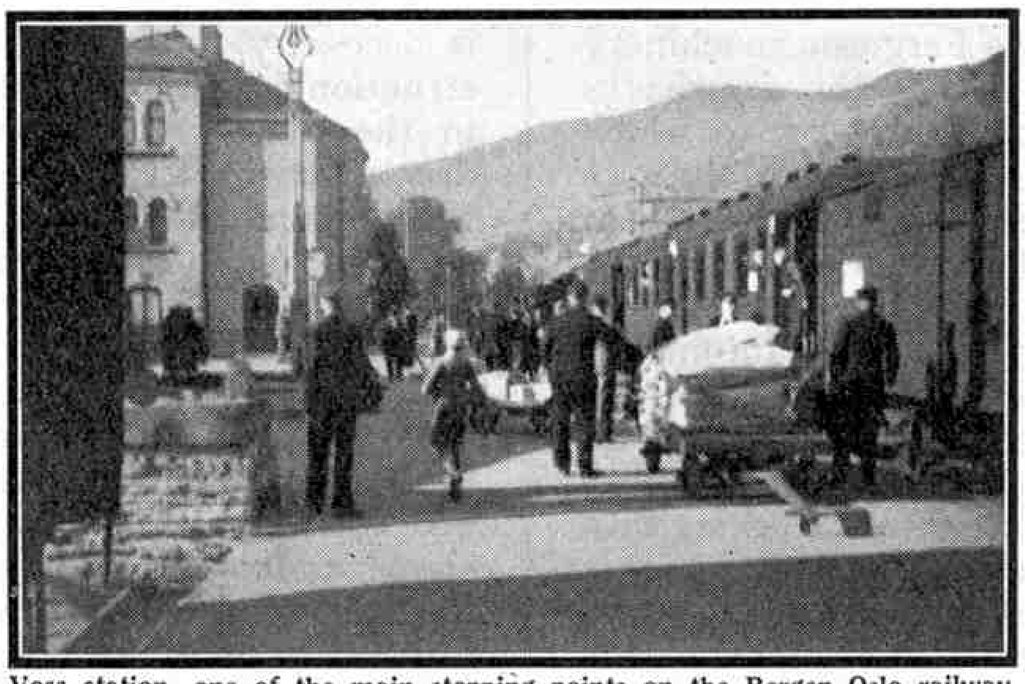
They stayed overnight at Rutbah and left next morning for Basrah, where they landed after a flight of 4½ hrs. They stayed only half an hour, but before they resumed their flight I was able to obtain several interesting photographs, one of which is reproduced on this page. From Basrah they went on to India.

A. KOUYOUMDJIAN (Baghdad).

A Trip on the Bergen-Oslo Railway

While on a visit to Norway I travelled by rail from Bergen to Oslo. I am sure that the scenic grandeur of the country through which this line passes is unexcelled in any other part of Europe.

The distance from Bergen to Oslo is about 280 miles and the railway journey takes between 12 and 13 hrs., according to weather conditions. I left Bergen one morning at 8 o'clock in a train consisting of a first, a second and a third class coach and a restaurant car. Immediately after leaving the station we plunged into a series of tunnels and proceeded at a slow speed in the darkness. Suddenly the train emerged into dazzling sunlight, with a sheer drop of 200 ft. from the line to a fiord below. Green fields and pine-covered hills were to be seen on all sides. The farmsteads dotted here and there had grass roofs and carved gables, and the bright red paint of their numerous outhouses emphasised the freshness of the country in which they stood. Soon the train drew into Voss station, and the passengers alighted for a snack at the restaurant.



Voss station, one of the main stopping points on the Bergen–Oslo railway. Photograph by G. Willis, London.

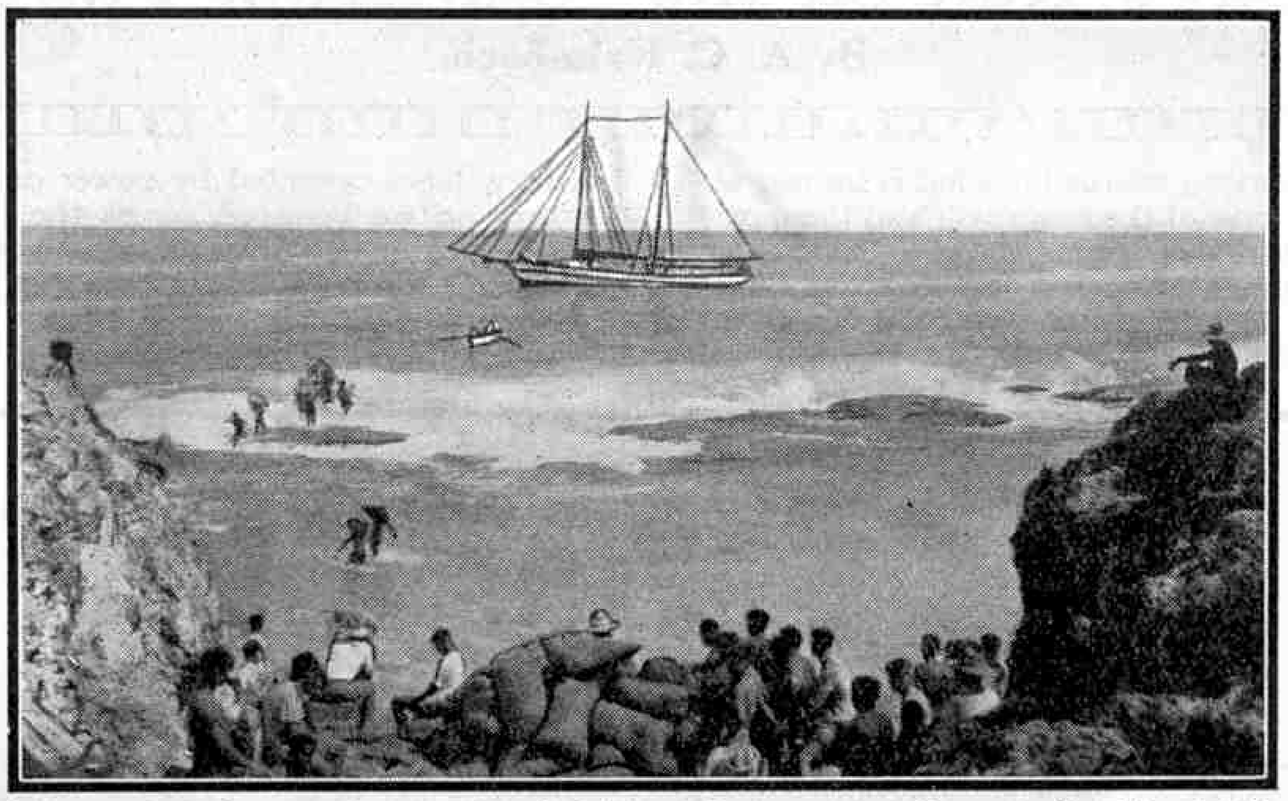
On resuming our journey the track became steeper and the speed of the train dropped. Trees and shrubs became less abundant, farms disappeared, and on nearing Finse the engine had to plough its way through deep snow. The temperature was 20 deg. F. below zero, and the atmosphere was very bracing. There another stop was made, and on resuming the journey at an altitude of about 4,000 ft. we passed Hardangejöklen, a mountain towering another 2,000 ft. higher. Then we plunged into numerous snowsheds.

Finally we reached Gulsvik and there began the descent. Trees and other forms of vegetation reappeared, homesteads came into view and mountain streams raced past as we ran briskly down the beautiful valley of Hollingdal, the engine pounding its way through dense forests on to Roa. Here the line turned south towards Oslo and soon we changed the darkness of the wooded hills for the lights of this ancient city.

G. WILLIS (London).

In the South Seas

The Cook Islands, about 26 miles north-east of New Zealand, are inhabited by Polynesians. One of the most interesting of these islands is Atiu, which is distinguished from the others by being fringed by the reef that surrounds the group, but is some distance from the shores of the others and entirely detached from them.



A schooner loading copra at Atiu, one of the Cook Islands. Photograph by L. Franzman, Christchurch, N.Z.

While on a visit to Atiu I saw the schooner "*Tiare Taporo*" loading copra, or dried coconut kernels. The name of this vessel means "lemon blossom." The water was too deep for anchorage, so the schooner cruised to and fro, using her auxiliary engine, while the bags of copra were carried by the natives through the surf to the edge of the reef, loaded into surf-boats, and rowed out to the schooner. Often a big wave would sweep the natives off their feet, but this only caused great amusement.

Atiu is connected with an interesting episode of the Great War. The "*Seeadler*," a German raider, was wrecked on a reef in the South Seas, and had to be abandoned. Count von Luckner, her commander, sailed hundreds of miles in a hastily rigged life-boat, and put in at the island on his way to the Fiji Islands, where he was captured.

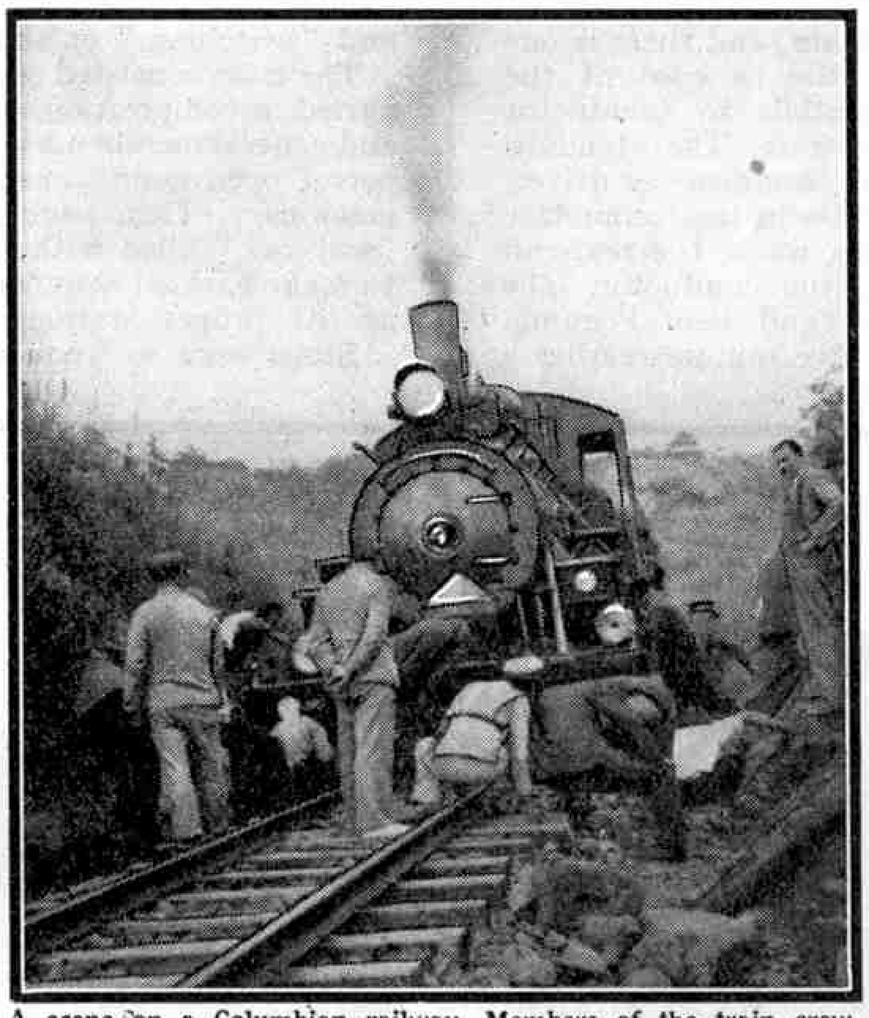
L. Franzman (Christchurch, N.Z.).

A South American Railway

I travelled recently by railway in Columbia, and had quite an eventful journey. The railway is about 80 miles long, and the service on it, which has been in operation for about three years, shortens the journey between Bogota, the capital, and the Atlantic coast by an appreciable distance. Before it was built goods were carried part of the way by rail and part by mule.

The railway is built in difficult country, among mountains, where rainy weather causes many landslides. For this reason it is not unusual for a train to be held up a dozen times in a single journey while the track is cleared. There are many sharp curves in the line, and the difficulties sometimes lead to derailments. All engines carry a supply of jacks, wedges and other implements for use in such emergencies. During my own journey on this railway the train was stopped several times by landslides, and on one occasion there was a locomotive derailment. The lower photograph on this page shows the crew levering the engine back on to the track.

W. B. Smith (Bromborough).



A scene on a Columbian railway. Members of the train crew levering a derailed locomotive back on to the track. Photograph by W. B. Smith, Bromborough.

A Visit to Hadrian's Wall

The great wall of stone built by the Emperor Hadrian about 1800 years ago across the narrow neck of the British Isles in order to keep back the savage Picts is a wonderful monument of Roman thoroughness that amply repays the time devoted to a visit.

The wall stretched from the Tyne to the Solway Firth, and many parts of it are still standing to-day. The two main features of interest are the forts or camps at Chesters and Housesteads. The former contains one of the most important collections of Roman antiques in this country, and many interesting facts about the actual building of the wall have been obtained from the inscriptions on the stones taken from it. Excavations have revealed the remains of granaries, ventilated floors, barracks, a general's house and baths; and such things as drainage gutters, the path worn by chariot wheels, and the still firm walls bear witness to the lasting nature of Roman building.

The Roman camp at Housesteads, some distance further west, is even better preserved, and shows the skill of the Roman builders to a much greater extent. In a small museum many interesting altars with well preserved inscriptions can be seen.

The wall between these two forts is only of medium height and it gives some idea of the amount of labour that must have been expended on its construction. For quite a few miles the wall runs along the side of the road, a ditch and rampart being on the other side. The entire wall was 73 miles in length, and there were believed to be 23 forts or stations at intervals along it, in addition to smaller places called mile-castles and watch towers.

The rampart to the south of the road ends when it reaches the edge of the tidal waters at the head of the Solway Firth, but the wall was built for some distance further, along the estuary. This was in order to prevent raiders from the North crossing the tidal flat at low water, or making their way over the Firth in small boats.

It is not known how long the wall stood in its entirety. Most of it disappeared eventually because mediæval builders treated it as a quarry, removing the stones for use in the erection of churches and farmhouses.

L. W. Peck (Thornaby-on-Tees).

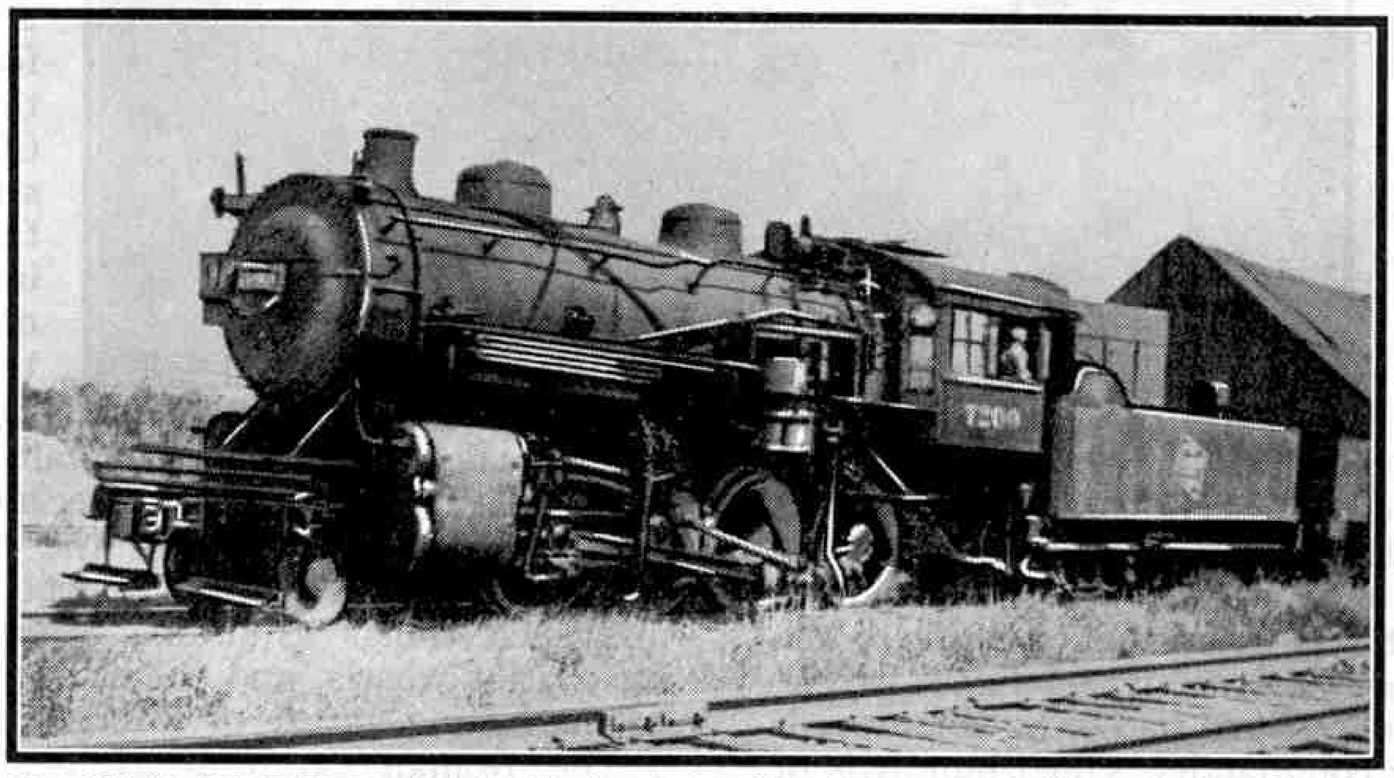
"Riding The Cab" of a U.S. Freight Engine

A Day's Run on the *"Sturtevant Patrol"*

By A. C. Kalmbach

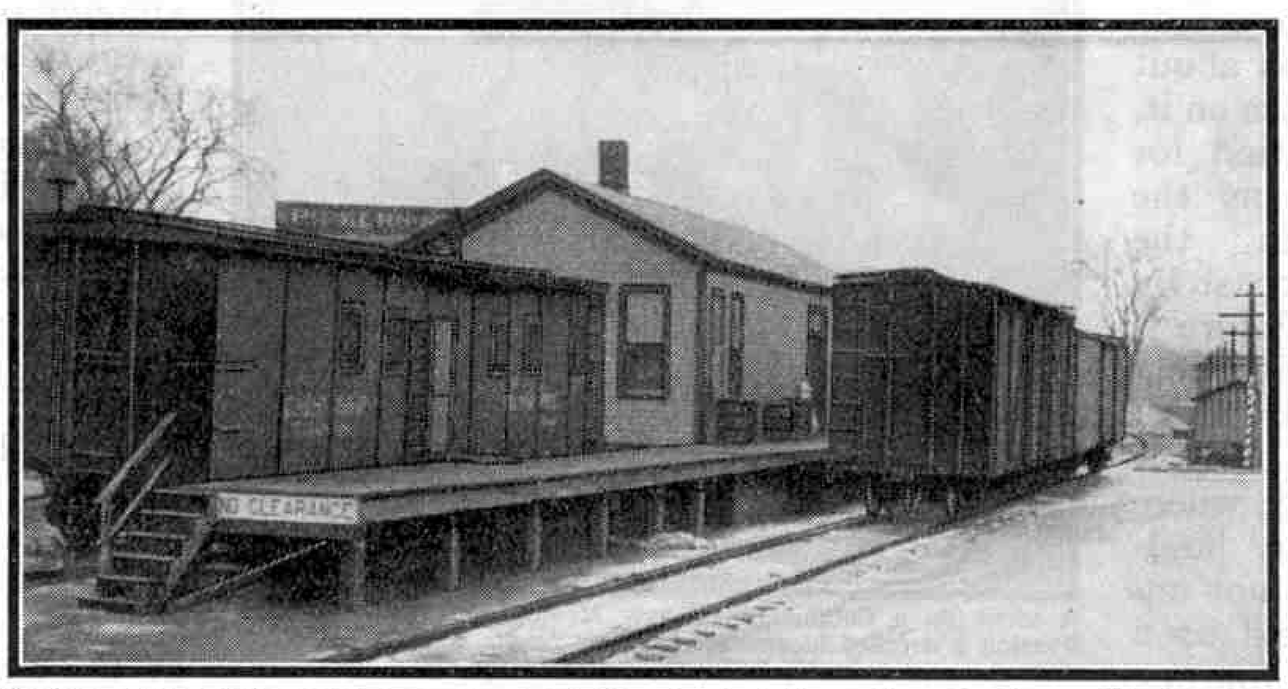
THE slowest train on any American railroad is what is known as the "way freight," the workhorse of the iron road; and the most interesting train ride I've ever had was "riding the cab," that is to say on the footplate, of the engine of such a freight train. This journey took 11 hours for the 60 miles from Galewood Yards in Chicago to Sturtevant, a small junction town on the line to Milwaukee, and the railroad was the Chicago, Milwaukee, St. Paul and Pacific, popularly known as the "Milwaukee Road."

On arrival at the starting point of my trip I looked over toward the dozens of yard tracks alongside the main line. The *"Sturtevant Patrol,"* on which I had permission to ride, was one of a dozen or more freight trains all made up, but as yet without locomotives. The caboose, a car with open platforms, has seats and desks inside and has a "cupola," which may be described as a kind of conning tower, for observing the train. It is the travelling office of an American freight train, and there is one at the rear of every regular freight. In the caboose of the *"Sturtevant Patrol"* I presented my credentials to Conductor Edward Bailey, the man in charge of the train. The standard American train crew consists of five men; the "engineer" or driver, the fireman, the front-end brakeman, who rides in the locomotive cab on freight trains and assists in switching work, the rear-end brakeman who rides in the caboose, and the conductor. The brakemen were introduced as Earl Johnson and Paul Penning.



No. 7200, the locomotive on which the trip described in this article was made. The engine is of the 2-8-0 or "Consolidation" wheel arrangement, and is a typical example of the older motive power in use on local duties.

Our time to go was 9.30 a.m., and about five minutes earlier a clink of couplings pushed together and a jolt in the caboose announced that an engine had been coupled on to our string of cars, making them into a train. The locomotive was No. 7200, an old one of the 2–8–0 type, built in 1912 by the American Locomotive Company, with Engineer Daniel Evans and Fireman Abraham Deihl in charge. White flags placed in sockets on each side of the boiler front indicated that we were an "extra," that is a train not running on a regular schedule. We took our train number, as all American extras do, from the locomotive and our direction, becoming *"Extra 7200 west."*



Freight cars being loaded at a country depot. The simple design and construction of this is typical of many similar buildings in the United States.

We were within that section of line known as "yard limits," and so could enter the main line without specific orders, looking out only for regularly-scheduled passenger trains. An upward swing of the conductor's arm from the caboose was our "highball," or starting signal, and after a routine test of the air brakes Evans put the reverse lever down in the forward corner, released the brakes, and eased out the throttle or regulator.

A switch tender or pointsman stepped from his shanty and opened the switch leading to the main line. This was not an important enough point to have a tower, or signal box, and interlocking with switches operated by power or rodding. Scarcely half a mile further on we bounced across the tracks of the intersecting St. Charles Air Line, one of the dozens of connecting railroads which criss-cross Chicago, tieing together the trunk lines and transcontinental railroads that terminate in this city.

At the "wye" or points leading to the main line an interlocking signal stopped us and we waited until train No. 5 for Milwaukee sped by. Green flags on the front of the boiler of its engine indicated that a second section was following, but the towerman handed a "fistfull of tissue paper" up to Engineer Evans, giving him his running orders. The first one said "Second 5, run 3 hr. 10 min. late," so we knew we had that much time before the second section came. The timetable showed one hour and a half before the next regular train, No. 21, so on the lifting of the signal we pulled out onto the main line and our real work of picking up, setting off, and "switching," or shunting freight vehicles began.

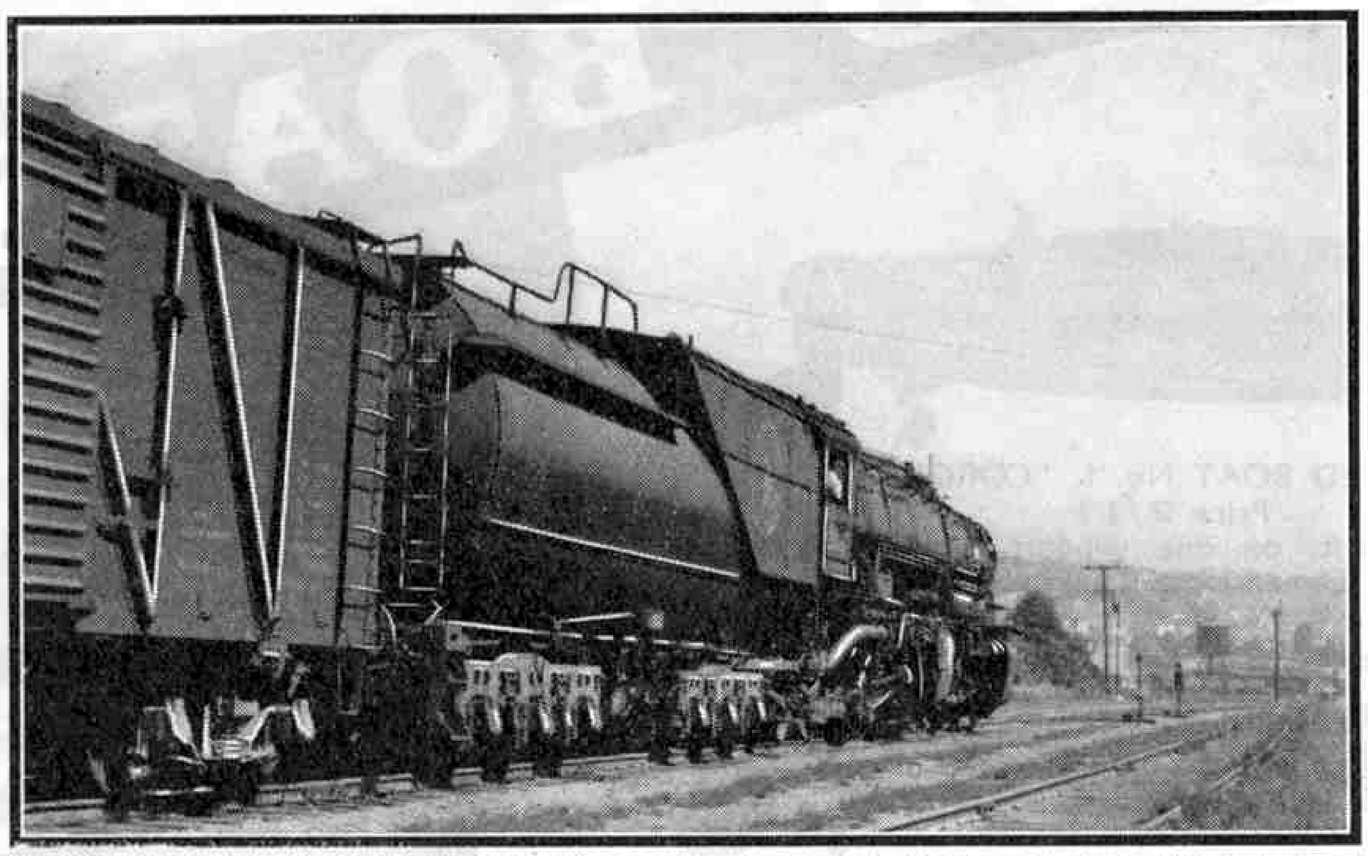
The train consisted of only 23 cars or wagons at the start, but was varied in composition, including box cars or goods vans of lumber and general merchandise, several tank cars of oil or gasoline, that is, petrol, open gondola cars of coal, and a flat car loaded with farm machinery. Then back at the rear next to the caboose was the "way car," filled with small lots of freight that were not enough to make carload shipments and so would be individually unloaded at the proper stations.

Stops were so frequent that our usual running speed between them was only 20 m.p.h. The first stop was at Forest Glen, about four miles from the point where we entered the main line. There I learned that we had much more work to do than the mere dropping of freight cars and the picking up of other loads or empty cars. Evans stopped the train with the way car right in front of the station, and the rear-end brakeman and the conductor started unloading the small freight. The first two cars behind the engine were consigned to Forest Glen, and so while the rear-end men were busy, the front-end brakeman uncoupled these cars and they were pulled ahead of the siding switch and backed in.

Conductor Bailey then said to the engineer, "The agent wants you to run up to the lumber yard and move a car they're unloading." We crossed to the other main track, ran up it a few hundred yards to a siding leading into a large lumber yard, and while the brakeman unlocked and opened the switch Bailey explained to me that at each local station we were under orders from the stationmaster, or agent. In this instance the lumber yard owner had telephoned the station that he wanted the switching done, and the agent ordered us to do it. Later the agent would send a bill to the lumber yard for our services.

We didn't pick up the several empty cars in the station yard, but started right up the line for the next stop, Morton Grove. "This is Monday, our busy day," explained Fireman Deihl, "and so we're only doing necessary work. We'll pick those empty cars up on our way back to-morrow, when we have more time."

The track ahead stretched out straight and clear, a perfect speedway for the Milwaukee-bound passenger flyers, which skim over it at 80 to 90 m.p.h. We didn't skim, however; instead we just plugged along up to Morton Grove Station. There two empty coal cars were to be picked up; they were placed so that they came ahead of us when the engine entered the siding where they were standing. How could we get them behind the engine where they belonged in the train? A "flying switch" was the answer. We coupled up to them and backed toward the siding points, gathering speed until just before the points Evans made a sudden brake application and Johnson at once lifted the uncoupling bar. Then, with opened throttle, we gathered speed while the cars lagged behind. Brakeman Penning threw the points between locomotive and cars, and these were switched on to the main line, in a position where we could back on to them from the siding. Again and again through the day this flying switch method was used to transpose cars and engine.



An interesting view of a typical freight train operation in the United States, showing a G.N.R. train of this kind entering the yard at Seattle. Photograph by W. Hendry, Vancouver.

The work at Morton Grove finished, we pulled ahead two miles to Golf. Beyond this small suburban station the railroad and state were building a bridge to eliminate a dangerous highway crossing. The station agent asked us to run up to the construction work and help unload and shift some cars of gravel being used for the concrete. We pulled up on the construction siding, and because it was nearly time for passenger train No. 21 to come up the main line, we pulled our train into the siding with us, and carefully locked the switch after us. Had we left it set for the siding the automatic block signals on the main line would have indicated "*caution*" two miles away, and "*stop*" at the signal nearest the switch.

Several cars of gravel were moved to better positions, some full cars were substituted for empties, and several nearly-empty bottom-discharging cars were shaken free of their remaining contents by the simple process of leaving the throttle partly open and continuously pulling the reverse lever from one end of the quadrant to the other. While this work was going on, No. 21 passed and we were then free to unlock the switch, back on to the main line and proceed to Glenview, where there was the usual routine station and private siding switching and unloading to be done.



Rear view of a caboose, or "travelling office," of a freight train. Windows in the raised portion of the roof enable the conductor to observe the running of the train.

It was nearly lunch time and we had been on the road some three hours. As we plugged out of Glenview, engineer and fireman agreed that we had better go in the siding up at the brick factory a short distance along and eat lunch at a restaurant there while "Second 5" and No. 101, the "*Hiawatha*," went by. The crack "*Hiawatha*," streamlined steam speedster of the Chicago-Minneapolis service, soon flashed by with its 430-ton train at about 100 m.p.h. We pulled out of the siding, leaving two loaded cars consigned to that point, and went on to Deerfield. At Deerfield we had a considerable amount of switching work to do, and several loaded cars to pick up. By now the cars we had been picking up exceeded in number those we had left behind, and our load had grown to 34 cars.

Eventually we reached Roundout, a junction point with a branch line and also with the Chicago Outer Belt Line. There we spent more than an hour shunting cars around on yard tracks; the empties left were to be picked up by an evening train and taken into Chicago, the loads allocated to the proper tracks for transfer or pickup by through trains.

We had a car of flour for delivery at a macaroni factory four miles down the branch line at Libertyville, so we had to arrange for train orders to permit us to go off the main line. The conductor went up in the interlocking tower and the towerman telephoned the dispatcher at Milwaukee. Running orders were then issued allowing us to travel over the single track branch to Libertyville and back. But not until we had waited for No. 139, a suburban passenger train.

Leaving caboose and train at Roundout we started off for Libertyville with the locomotive and the car of flour, all five of the crew and myself in the cab. The ride was fast and rough, for this old "Consolidation" type engine was not built for smooth travelling. The car of flour was left at an unloading platform and two empties were picked up by the "Dutch switch" method, using a favourable grade to let a car coast into position behind the engine.

Back at Roundout we found it was nearly six o'clock. when regular hours expired and overtime started for the crew. So Conductor Bailey figured that, since we had 30 miles still to cover, we had better do only the necessary work and leave the odds and ends for the next day. After waiting 10 minutes for No. 9 to pass us, we started off for Gurney, seven miles away, to pick up a car of stock. Stock must be watered at regular intervals, and the railroad company is responsible for it under very strict federal law while it is in the company's charge. There we also had to unload several hundred pounds of miscellaneous farm implements from the way car.

Meanwhile Bailey had told the trainmaster by telephone of our intention to cut the work short in order to save overtime. As we had only half an hour before No. 11, a through passenger train, was due, the crew decided to go to Ranney, 13 miles ahead, where the siding switches were power-operated from a tower and it was easy to "go in the hole," or clear the main line by getting in a siding.

With time short our only really good show of running all day was on the 13 miles to Ranney, which were covered in just 25 minutes. The reverse lever was hooked up almost to mid-gear and the throttle was kept about half open. Between watching signals Fireman Deihl spent all his time with the fire, and kept the gauge on the mark at 180 lb. We had just pulled into the siding at Ranney when the headlight of No. 11 appeared. This is a named train, known as "*The Sioux*," running out to the country along the Missouri River in South Dakota, and carries Pullman sleepers in addition to the usual coaches, diners, and baggage and mail cars.

As we pulled out of the siding, ahead of us stretched the 10-mile tangent to Sturtevant. The three-unit Sturtevant home signal grew closer and closer, and the centre light changed to green; we slowed down to move gently over the switches into the Sturtevant yard.

Engineer and conductor went through the formality of signing the train register in the station to prove their arrival and time of arrival. Then they uncoupled the caboose, pushed it up a slight rise in the yard track, and let it coast back and into a small stub track in a quiet location, a perfect Dutch switch. Regular sleeping car berths came down from the ceiling and the caboose was ready to serve as the night's lodging place for the crew.

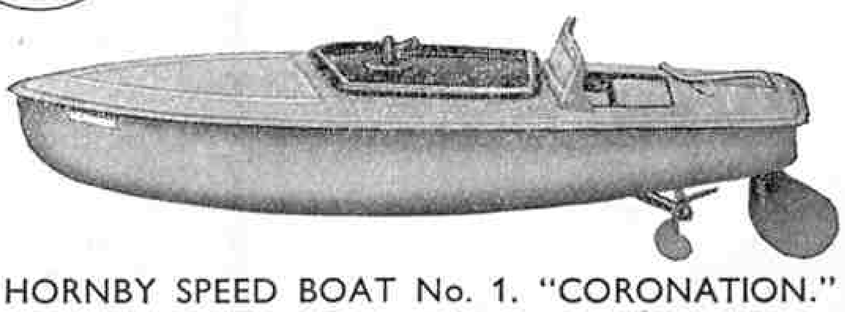
SPEED BOATS

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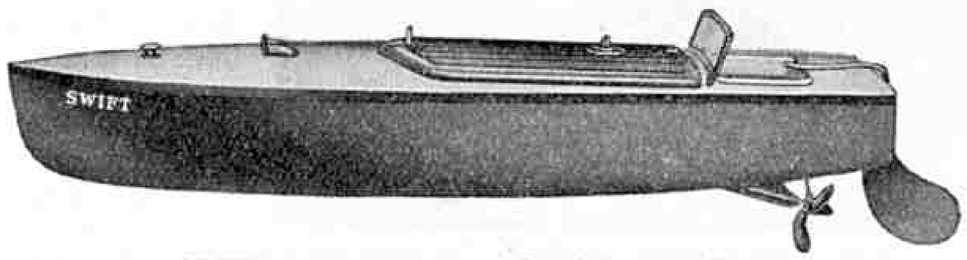


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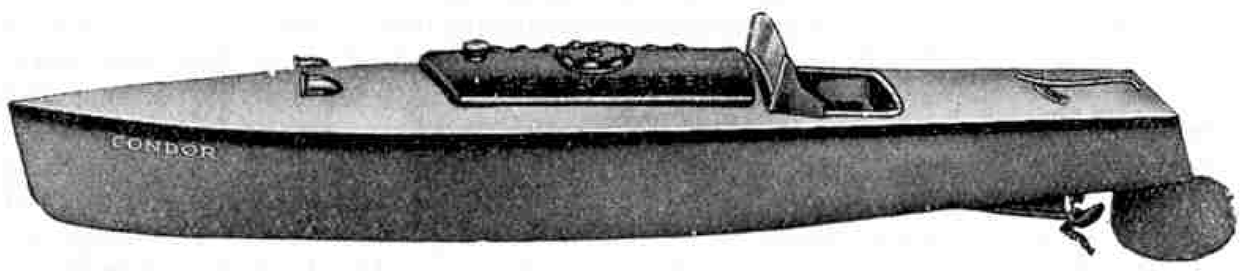
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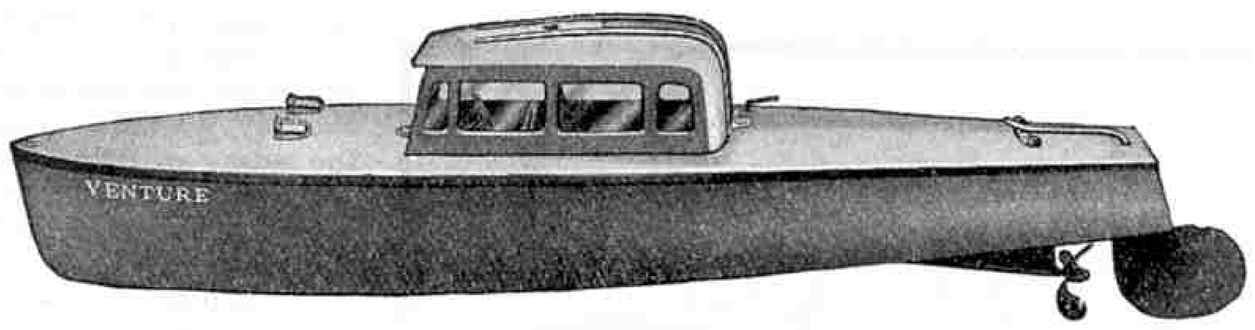
HORNBY SPEED BOAT No. 1. "CORONATION."
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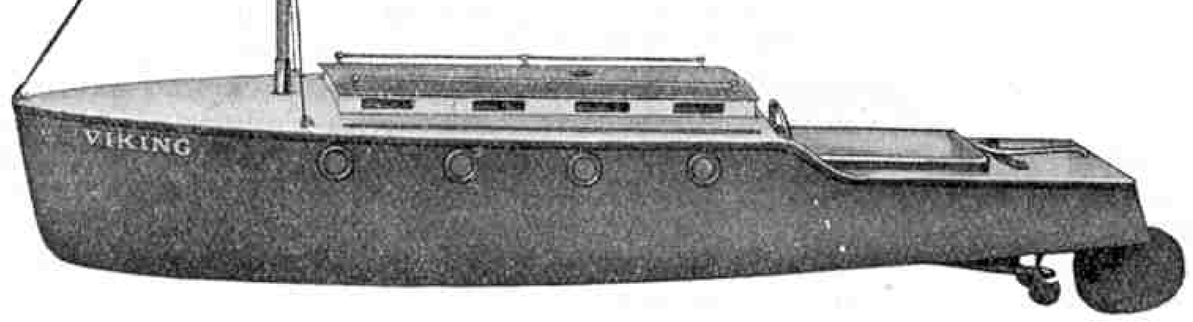


HORNBY LIMOUSINE BOAT No. 4. "VENTURE."
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PENNANTS
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Enjoy the Thr
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SPEED BOATS

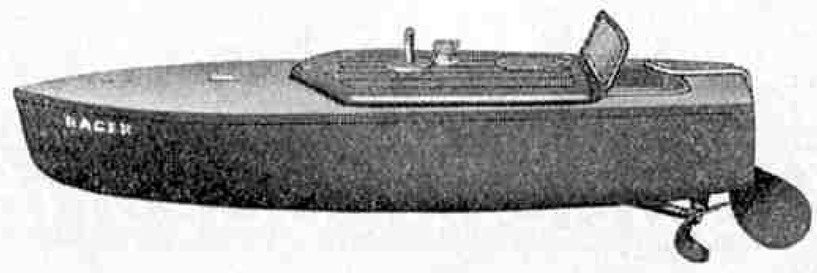
exceptional speed and length of run. They steer well—a very important feature in any speed boat—and they possess the good quality of being very steady in the water.

RACING BOATS

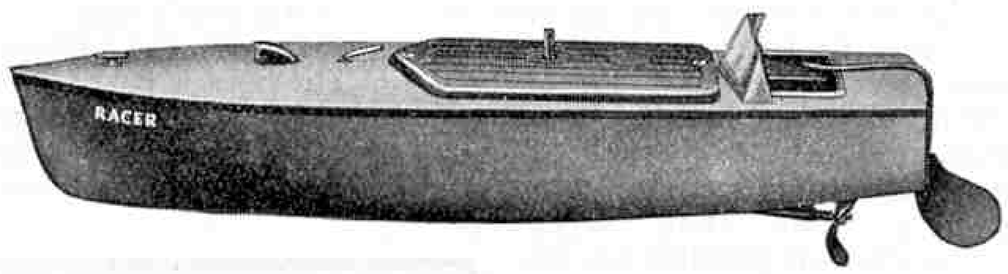
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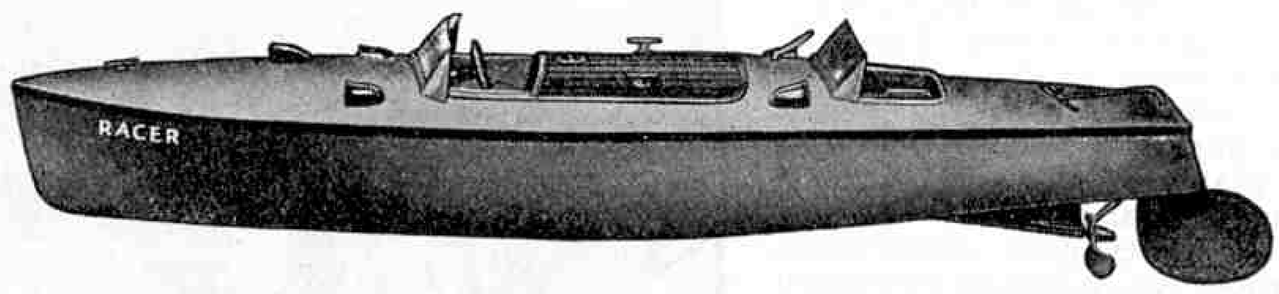
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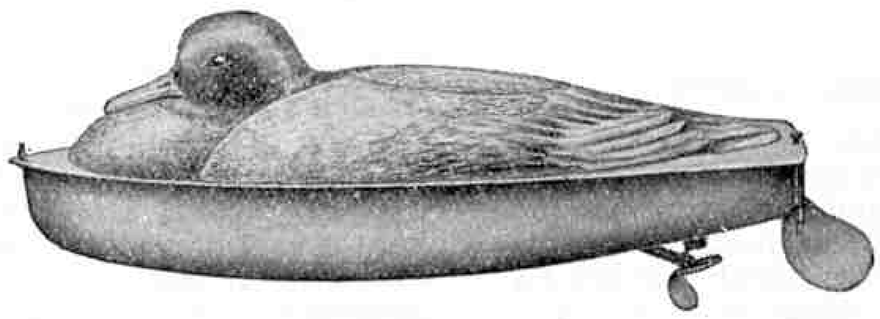
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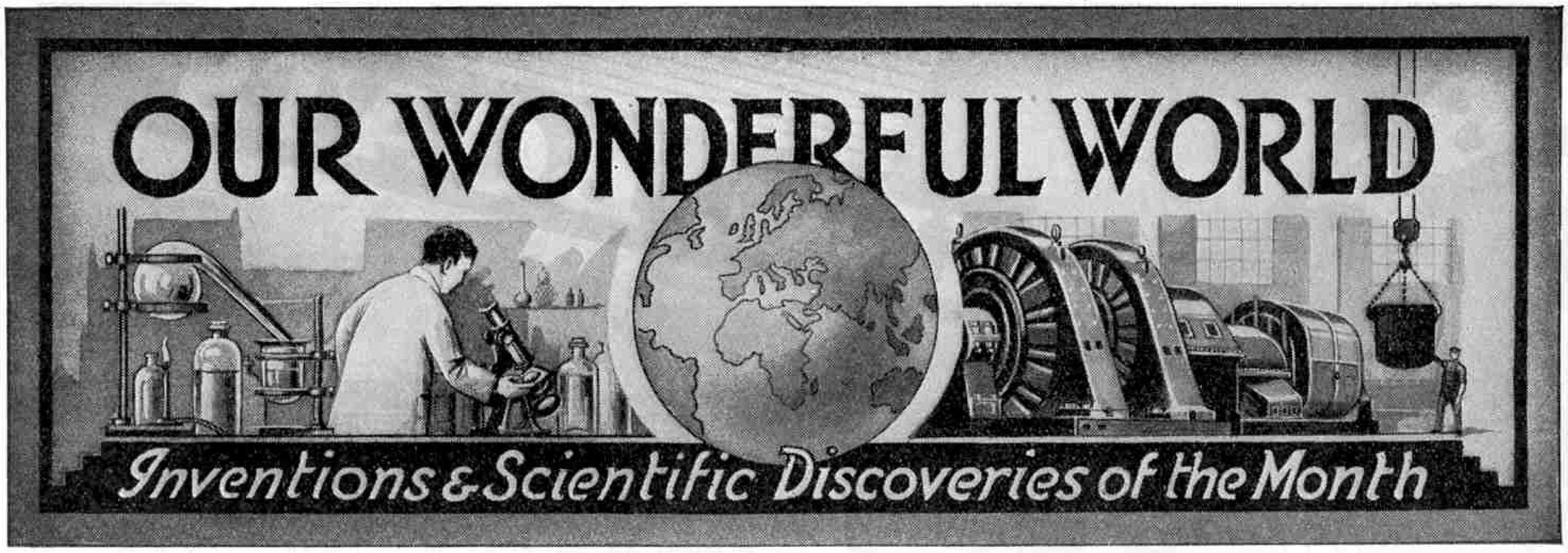
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This novel boat is particularly suitable for young children. The deck carries a realistically moulded model of a Duck.



HORNBY WATER TOY (DUCK). Price **2/6**
Travels over 100 ft. on one winding. Finished in appropriate colours. Dimensions: Length 9¼ in. Beam 3 in.



A Remarkable Total Eclipse

During last month attention was once more concentrated on the Sun because of the total eclipse that began on 8th June. This eclipse was remarkable for several reasons. One was that it lasted for a longer period than any other for more than a thousand years, the duration of totality being slightly more than seven minutes. The greatest possible period during which the Sun can remain obscured by the Moon is about eight minutes, and at most eclipses the period is much less. Thus at first glance the event promised to afford astronomers one of the finest opportunities that they have ever had. Unfortunately the track of the eclipse was almost entirely across the Pacific Ocean, and only a few scattered Pacific islands were at suitable points for astronomical work. In spite of these difficulties good observations were made. An American expedition made its headquarters on Canton Island, in mid-Pacific, where conditions were perfect and splendid photographs were taken.

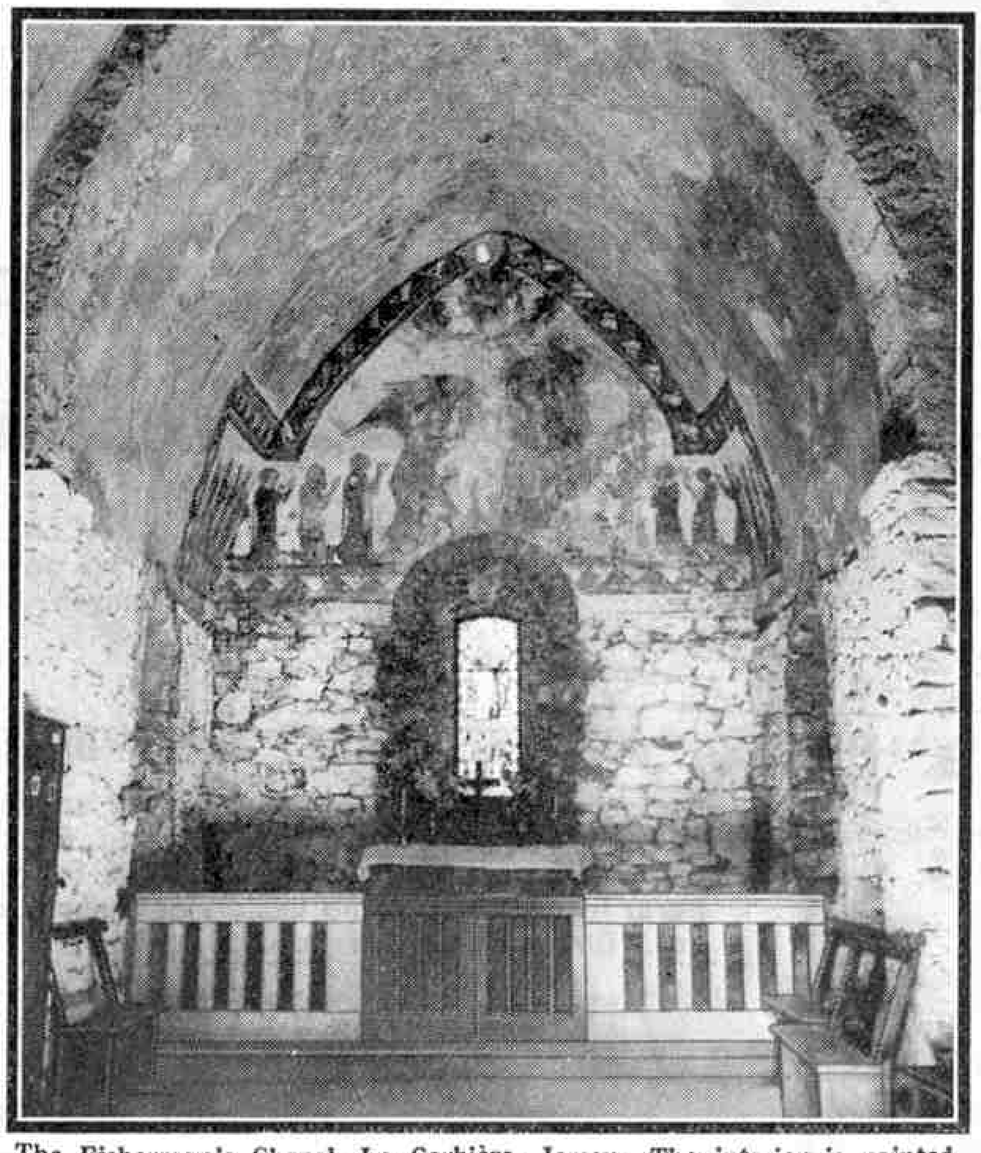
Another interesting feature of the eclipse was that it began on Tuesday, 8th June, and finished on Monday, 7th June! This sounds impossible, but the apparent contradiction is due to the fact that in its eastward course across the Earth's surface the Moon's shadow swept over the International Date Line, which runs southward across the Pacific Ocean from the Baring Straits. The day begins officially at this line and spreads westward, dying out again on returning to the line from the opposite side 24 hours later. The eclipse began in the East Indies soon after sunrise on Tuesday, 8th June, and the track crossed the date line while it was still Monday on the eastern side.

Photographing Sunspots

Total eclipses of the Sun are rare, for there can be no more than five eclipses of any kind in a year, and conditions are not always favourable for astronomers when an eclipse does occur. Fortunately we are no longer dependent on them for our knowledge of many of the interesting changes that occur on the Sun, for ways of observing these at any time have been discovered. The great prominences, or flames that shoot to heights of many thousands of miles above the surface of the Sun, formerly could only be seen at eclipses, when the disturbing effect of the daylight was eliminated. Now their course can be followed by broadening the light from the edge of the Sun's disc into a band of colour by means of the prisms of the spectroscope. The light is passed first through a wide slit, and the shape and size of the prominences is then shown in the light given out by the hydrogen or other elements in them. This ingenious method was devised independently by the famous British astronomer Sir Norman Lockyer, and by M. Jannsen, a French scientist. To-day the entire face of the Sun can be photographed in a similar manner. The lower illustration on the opposite page is a reproduction of such a photograph, known as a spectroheliogram, taken by the light emitted by incandescent hydrogen, and shows an immense bright eruption in progress and about to cover a Sunspot.

We depend on the Sun for light and heat, but there are other interesting associations between the Sun and events on the Earth. For instance, there is some ground for connecting the changes in the number and size of spots on the Sun with our weather. Sunspots vary in accordance with a cycle of 11 years, their total area rising to a maximum and falling again to a minimum in that time. Similar 11-year cycles have been traced in the growth of trees, in the levels of the great lakes of Central Africa, which of course depend on the amount of rainfall in their catchment areas, and in many other directions. Sunspots appear to be connected also in some mysterious manner with the magnetic storms that occasionally upset the Earth, disturbing electrical and magnetic recording instruments.

Another effect of great interest has now been discovered. Bright eruptions such as that shown in our illustration seem to affect short wave radio transmission, for when they break out there often is a more or less sudden and complete radio fade-out. The interruptions last about 15 minutes, and seem to occur about every 54 days.



The Fisherman's Chapel, La Corbière, Jersey. The interior is painted with pigments made from seaweed and the colours show clearly only in rainy weather. Photograph by G. P. Warner.

The Largest Flower in the World

I was interested to read that a giant plant from Sumatra had blossomed in the Botanical Gardens in New York, because its flower is the largest in the world. The New York plant is nearly 9 ft. high, and those who wished to examine closely the interior of its flower, which is similar to the well-known arum or "lords and ladies," had to mount a stepladder in order to look down into the bell.

The botanist calls the plant *Amorphophallus titanum*, and in its native country it is said to reach a height of 17 ft. The New York specimen is not the only one that has been transported to temperate climates, where it is grown under glass in conditions as closely resembling those of Sumatra as possible, for there are plants at Kew and in Hamburg. It very rarely flowers away from its home, however. The bloom has a smell resembling that of decaying fish, but is so extraordinary in size and grows so rapidly that it attracts notice whenever it appears. A flower that developed at Kew ran through its rapid course in six hours, and as a result few people were able to see the extraordinary spectacle. The central column in the funnel-shaped sheath of this flower was more than 3 ft. in height and 6 in. in diameter. Unfortunately there does not appear to be any prospect that the plant at Kew will distinguish itself by producing a flower this year.

Chinese Sampans with Diesel Engines

The junks and sampans of China have long been famous. The former are clumsy craft, with high forecastles and poops, and pole masts carrying square sails of matting, and are slow and awkward to handle, but are excellent sea-going vessels. The sampans are smaller boats, usually about 15 to 20 ft. in length, and are to be seen in thousands on rivers and in harbours. At Canton there is a regular floating city of sampans, each housing a complete family, often with a lodger or two.

The designs of junks and sampans have remained unchanged for centuries, and it is somewhat surprising to find that sampans fitted with Diesel engines have now been built. These curious vessels are shown in the upper illustration on this page and are in use at Amoy, a port about half-way between Hong Kong and Shanghai. At Amoy there is a huge fleet of sampans for hire, these vessels being propelled by a stern oar, by sweeps or by sail; and the motor sampans illustrated have been developed from those used for fishing and for crossing the harbour.

The new vessels are 52 ft. 6 in. long, and thus are larger than the ordinary sampans. They have proved seaworthy and easy to manœuvre, although they have a very rapid roll and an equally swift recovery. They are employed by the Salt Revenue Office of Fu-kien province as preventive boats for inland and coastal waters, and were constructed by Amoy junk builders, who were unaccustomed to working from drawings. The use of specifications bewildered them a little, and at times led to curious results. For instance, the frames are of varying thicknesses throughout their length. The reason for this is that pieces of wood with a minimum breadth equal to the specified width were selected, and the Chinese carpenter thought it a great pity to waste wood by cutting them down to uniform thickness. The boats are well constructed and very strong, however, the frames and all planking under water being constructed of koli, a very hard wood, and the upper structure of pine.

Two 27 b.h.p. Ruston and Hornsby marine Diesel engines are installed in each sampan, and in trials a speed of 8½ knots was reached over a measured mile, one engine alone giving a speed of nearly seven knots. With the use of the engines the boats can be turned almost in their own length when travelling at full speed. With their high prows they should produce a terrifying effect on wrongdoers.



Chinese sampans in which Diesel engines have been installed. These vessels can turn almost in their own length when travelling at full speed. Photograph by courtesy of Ruston and Hornsby Ltd.

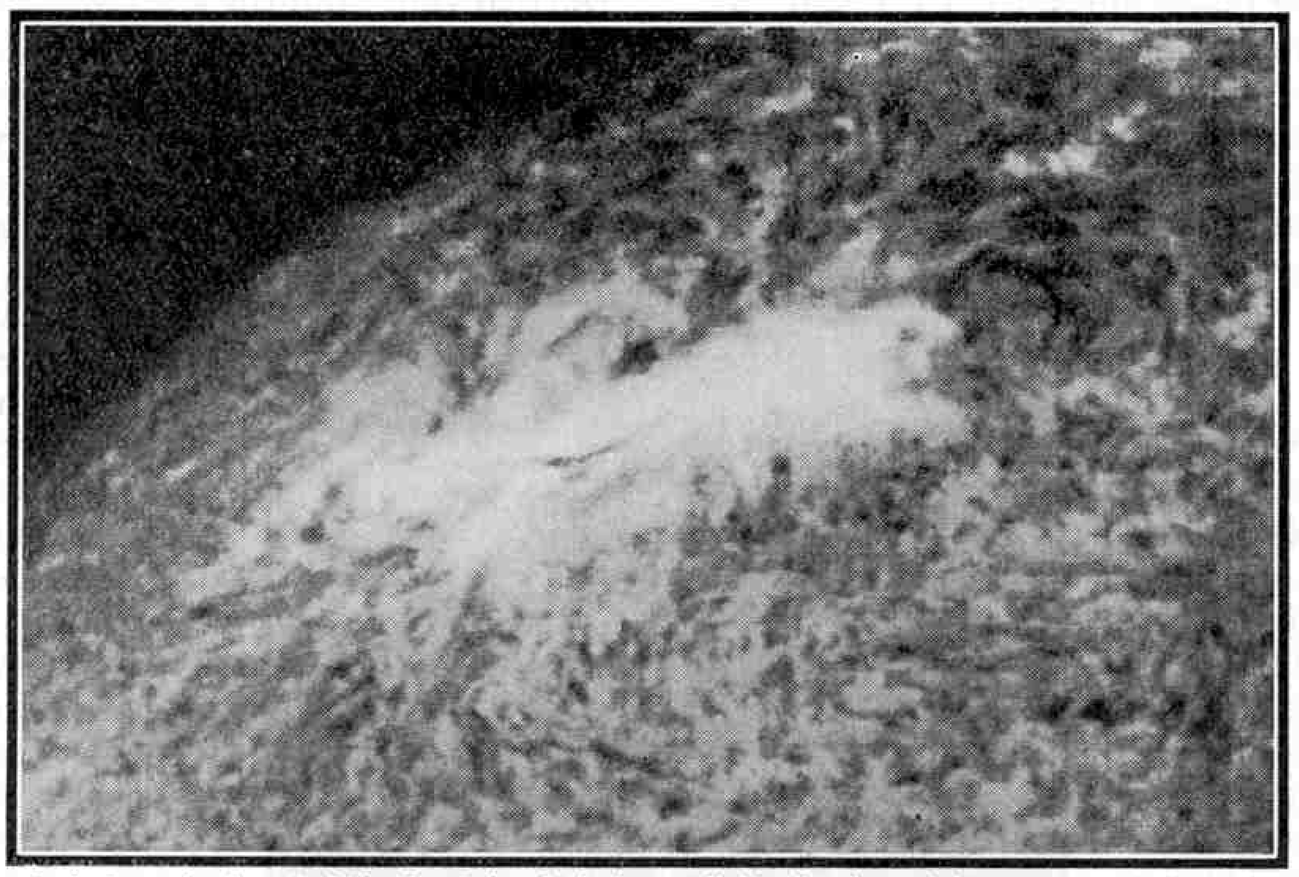
Tree of which no part is Wasted

Every part of the coconut palm is put to good use for some purpose, either in the regions where it grows or in industry. The natives use its roots as fuel and as medicine, and are said to roast them to make tooth powder. The trunk also supplies fuel as well as timber for building and furniture, and the leaves are converted into torches or brooms, or sewn together to make thatch for the houses.

Mats are made from the fibre of the husks of the coconut itself, and even the shells have their uses, for they are the commonest native drinking vessels, and also are burned to provide the heat necessary to dry the kernels in making copra. The milk is an excellent beverage. The copra or dried kernel, is the source of the valuable coconut oil, and the residue left after this has been extracted is made into oil cakes for cattle.

The charcoal made by burning coconut shell is of special interest because it has the remarkable power of absorbing large amounts of gases. Ammonia seems to be taken up with special ease, and a piece of coconut charcoal will absorb 171 times its own volume of this gas. Such gases as oxygen and nitrogen are not absorbed to so great an extent, except at very low temperatures.

Other forms of charcoal made at comparatively low temperatures also have this capacity for absorbing gases. How or why they take up the gases is not known, but it is believed that these adhere in a layer to their surfaces. Because of this power active charcoal is sometimes used for removing gases from sewers and foul places, and an interesting application that has been found for coconut charcoal is in making gas masks.



A photograph of part of the Sun taken in hydrogen light, showing a bright eruption in progress. Photograph by courtesy of the Carnegie Institution of Washington.

How Hard is a Diamond?

Although most people know that the diamond is the hardest substance known, few realise how much harder it is than other substances. The record of a diamond used in a Detroit motor car factory gives some idea of this. The diamond weighed less than a carat and was used in a machine to finish off the boring of the wrist-pin holes in aluminium alloy pistons. This alloy is more abrasive than either iron or steel, yet the diamond removed a thread of metal 9,000 miles long at the rate of about 926 ft. per min. The diamond was not worn even then, and only needed re-pointing in order to make it fit for more work of the same kind.

A Peculiar Australian Lizard

The readiness with which many animals can grow new limbs is one of the most amazing of Nature's feats, and the frog lizard of Australia provides an excellent example of this. Its tail is very fat and is used as a prop. It is easily broken off, but a new one soon grows and lizards with two tails are sometimes seen, one being the old damaged tail and the other a new one growing. When attacked the frog lizard can even cast its tail, which wriggles about and attracts attention, thus allowing the lizard to escape unobserved.

This strange creature has a head so remarkably like a frog's that it seems to be the connecting link between the frog and lizard families. Another name given to it is the barking lizard, from the noise it makes when teased, which is strangely similar to the bark of a dog.

Do Animals Live Longer in Captivity?

Many people believe that it is cruel to keep animals in captivity, as then they do not live natural lives and are restricted in their movements. In a well-run zoo most of them are healthier and live longer than in the wilds. It is said that few wild beasts live to be really old, as they fall victims to younger and more alert enemies. For instance, lions at large rarely live to be more than 10 years old, but in captivity may reach the age of 25 or 30 years.

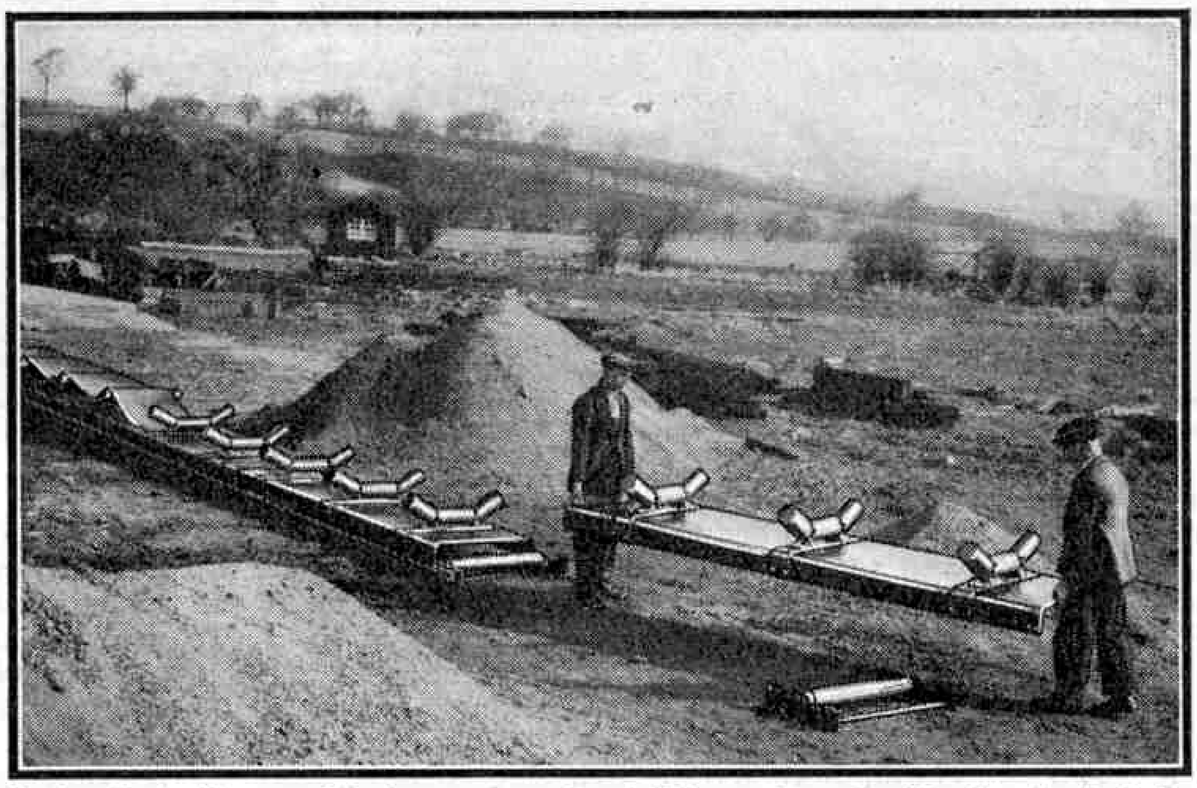
Belt Conveyors built up in Units

Clay and Coal Carried up Steep Slopes

IT may almost be said that to-day we are living in an age of conveyors, for these are being brought into use in practically every branch of industry. They are employed for moving such different materials as sand, coal and ores on the one hand, and chilled meat unloaded from refrigerator ships and loaves of bread passing through ovens on the other. In works and factories articles of all kinds are moved from place to place by means of them, and manufacturing operations are speeded up by the use of conveyors on assembly lines and tables. Even people are carried by conveyors, for the escalators used at underground stations and in large stores are simply specialised forms of these devices.

Conveyors vary according to special requirements. Rubber covered cotton belts, or belts made of some other flexible material, are used for light things, such as telegraph forms, which are carried from one section of a large Post Office to another by means of band conveyors, and even for articles weighing nearly a ton. For rough or heavy work the moving part may consist of wood or metal plates carried round by a travelling chain, as in the plate band conveyor used in the German brown coalfields and described and illustrated on page 276 of the "*M.M.*" for May of this year. Conveyors of this design with steel tops are used in foundries in many modern engineering works, where they carry heavy moulds and castings. In the large foundries where there is a steady supply of molten metal, this is not carried to the moulds, as is the practice in small foundries. Instead the moulds are brought in turn by means of conveyors to the pouring ladle, which is refilled as required. Thus the use of a conveyor ensures that work is carried on continuously and with little delay.

Another interesting form of conveyor is the chain grate used in certain types of boiler furnace. This carries the charge of coal through the furnace, and has to withstand the effect of very high temperatures. For this reason the grate is usually made of an alloy of iron and nickel.



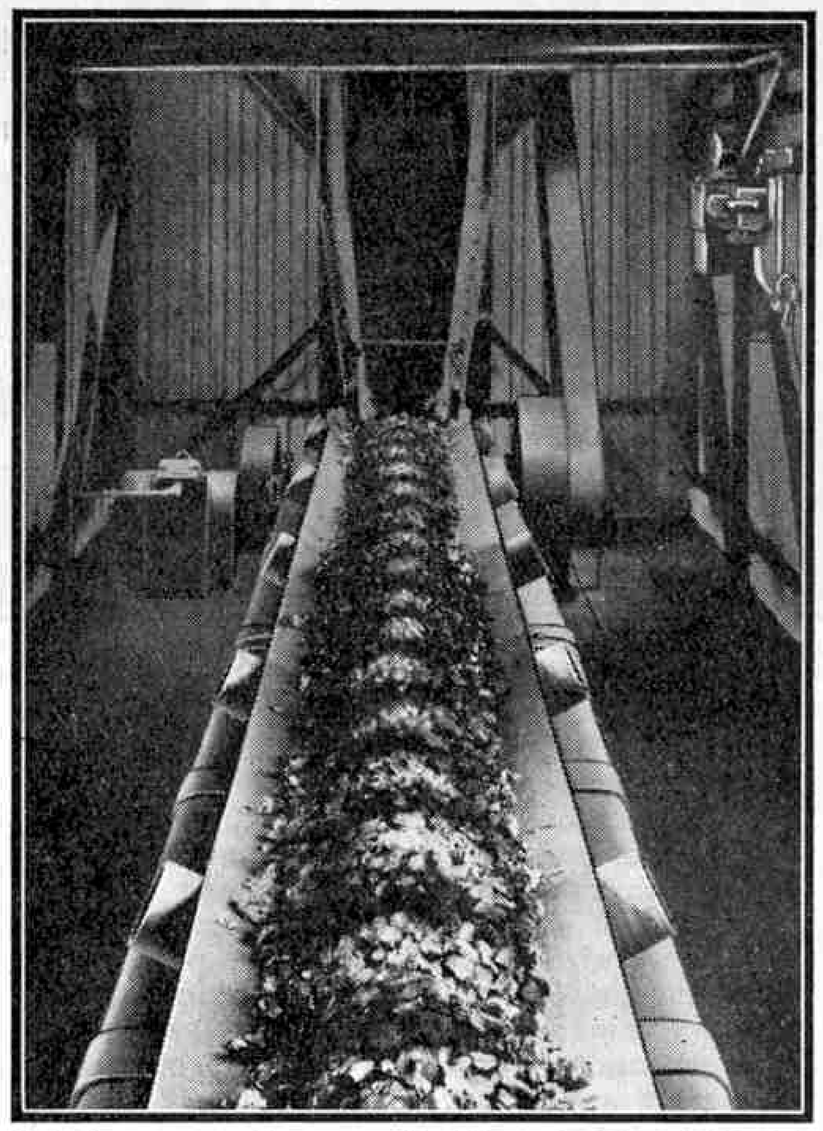
Each unit of a Mavor and Coulson conveyor is a rigid inverted trough with rollers for the belt. The illustrations to this article are reproduced by courtesy of Mavor and Coulson Ltd.

Most conveyors are designed for use in some particular task, and are fixed in length and position. A particularly interesting type that can be built up from standard units, and therefore can be lengthened when necessary, has been introduced by Mavor and Coulson Ltd. This conveyor is light and can be put together quickly, and as easily taken down again, and thus there is no difficulty in moving it from place to place. It is of incalculable value in many operations for which ordinary belt conveyors cannot be used, and the replacement of shovelling, wheeling or carrying by conveyance in this manner greatly speeds up the movement of many different kinds of material and reduces working costs.

The units are rigid structures, like inverted troughs, and are about 12 ft. in length. They carry rollers over which the belt runs, and the sections are joined by fastening them to angle bar supports to produce a continuous length of conveyor. The belt returns in the space under the inverted trough, where it is supported by other rollers.

There are three sets of rollers to each section, and normally each set consists of three rollers, or pulleys, with the outer rollers inclined upward so that the edges of the belt running over them are raised in order to prevent spilling of the material carried. A larger roller either at the end of the conveyor or working on the return belt is used for driving. The intermediate rollers are idle, simply turning round as the belt is pulled over them, but they offer practically no resistance to the movement, as they work in ball bearings. In very wide conveyors the number of rollers in each set may be increased to five in order to give adequate support to the broader belt.

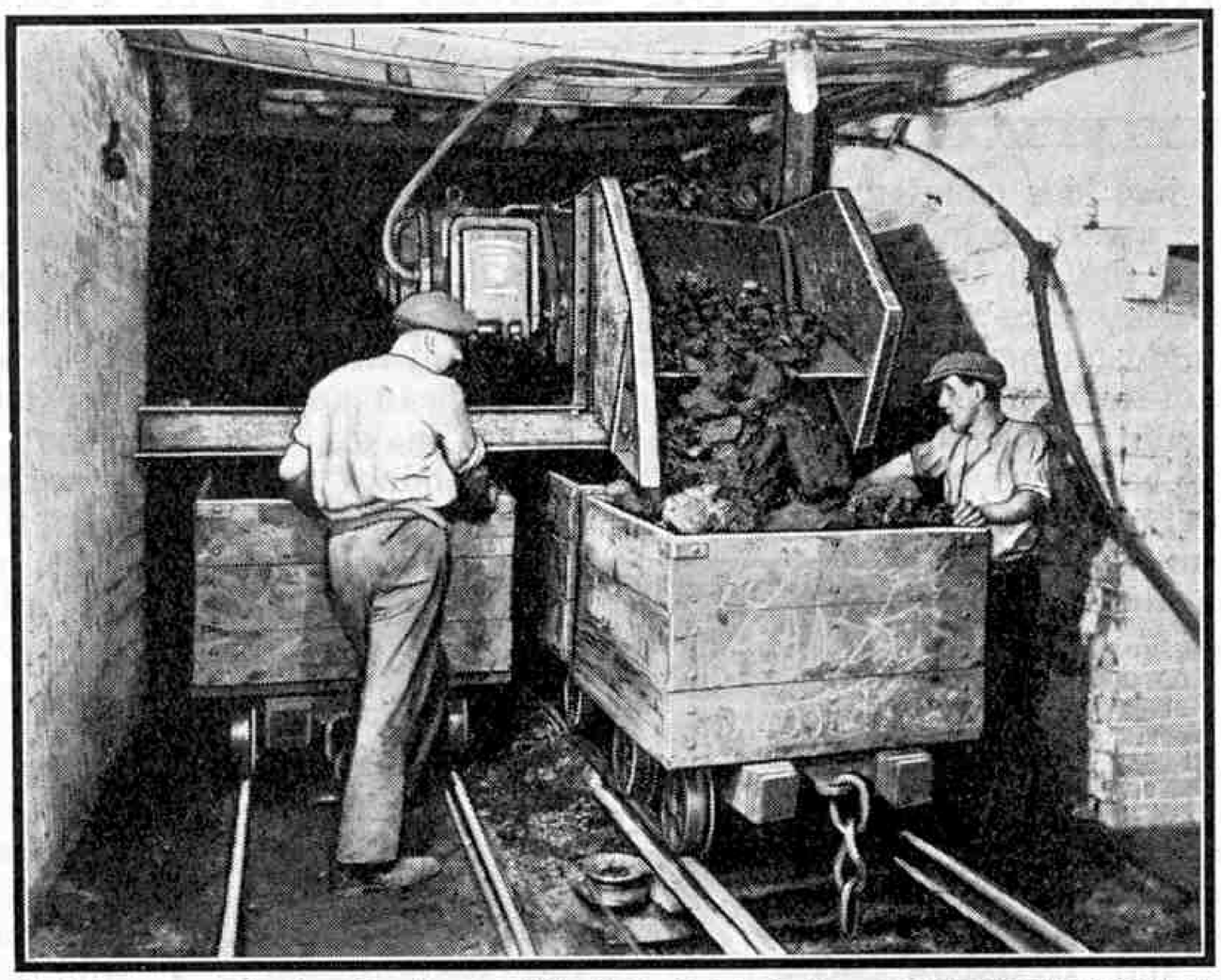
The tensile strength of the belt is provided by cotton fabric, and it is covered with rubber, which is tough and can be used for all kinds of materials. At one factory it actually is used to convey broken glass, which is fed on to it through hoppers, and there is no risk of scattering this awkward material because of the upturned edges of the belt. Although in most cases the conveyor is laid down on



A belt conveyor at a gas works. The material carried is fed on to the belt from an elevator.

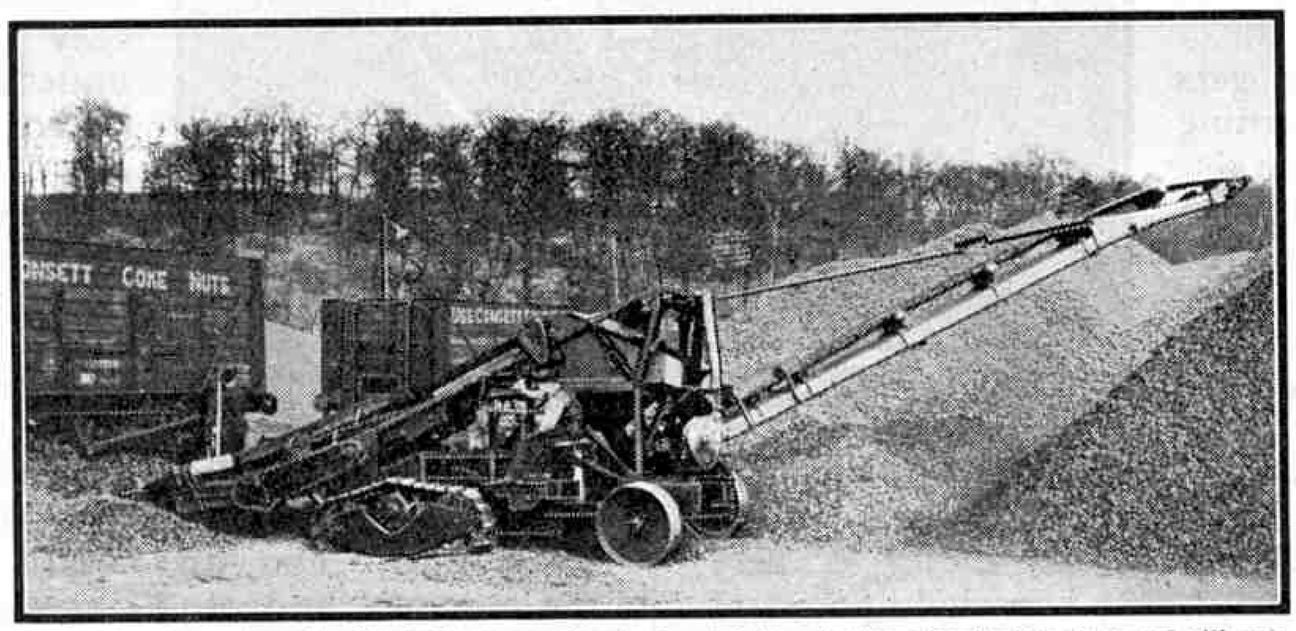
comparatively flat surfaces, it can carry many materials up inclinations of as much as 18°, and some materials up one of even 25°. It is not necessary to support a sloping conveyor throughout its length, trestles or similar structures at the ends of the unit sections being sufficient, and an upward curve can be relatively sharp, for the belt does not lift off the idlers owing to the small amount of friction.

Interesting examples of the use of the Mavor and Coulson sectional belt conveyor are provided at several new brickworks. At each of these the whole output of the claypit is carried from the excavator that digs it out to the brickworks by means of two conveyors. The first of these is laid down parallel to the track upon which the excavator runs, and is moved sideways by simply levering it along slides when it is necessary to change its position. Clay deposited on the belt of this conveyor by the excavator is delivered to that of a second conveyor at right angles to it, and on this is carried to the machinery tower, in which the bricks are made. In order to enter the tower the second conveyor rises at a slope of 1 in 3.



Coal from the working face of a mine brought to the loading station by means of a Mavor and Coulson sectional belt conveyor. The conveyor can be extended as the coal face is advanced.

Sectional belt conveyors are particularly suitable for dealing with coal in the mine, at the pit head and during distribution. They are readily laid down in the galleries underground, where they are particularly valuable because they can be lengthened as the coal face advances. At the same time the loading station, where the coal is delivered by the belt into trucks, can remain in the same place for weeks or months. At a South African colliery, the mouth of which is on a steep hillside, two conveyors in tandem carry 250 tons of coal an hour a quarter of a mile down the slope in order to bring it to the screens. These conveyors are driven electrically, and when working fully loaded generate electrical energy of 40 h.p., which is returned to the line. They are stopped when required by means of weight-operated solenoid brakes.



The Joy Loader automatically picking up coke discharged from bottom-tipping wagons and piling it 12 ft. high by 40 ft. wide in a neat dump. At the same time it screens out the smalls and dust.

The ease with which the conveyor can be made to work at steep angles is illustrated by the plant of a Derbyshire colliery where an old shaft was modernised, with the result that the output had to be carried to cleaning plant separated from it by railway tracks. The problem was readily solved by building a light six-span bridge across the tracks and installing in this a sectional belt conveyor. At coal handling plants these conveyors are used for carrying the coal to screens, and for dealing with slack and dust removed from it, and similar use is made of them for many purposes in gas works.

Sectional belt conveyors also are largely used in disposing of unwanted material from quarries, whatever the depth from which this has to be moved. When such material is dumped by ordinary means it often forms a formidable heap on which scaffolding of some kind becomes necessary for the tipping plant. The use of the conveyor avoids this, for it can be extended over the rubbish tipped by it in order to distribute the material further on. Thus the conveyor actually makes its own road, being simply extended section by section, as this becomes necessary. It is not uncommon to make use of conveyors built up in this manner to a length of 500 ft., or considerably more.

An interesting device that is used in making a dump is a "shuttle conveyor." This is a separate construction, pivoted at one end, along which a conveyor belt runs, and it is placed at the end of the main conveyor, which delivers material on to it. This is dropped off the outer end of the shuttle conveyor as the belt turns over. The special feature of the device is that it can be swung sideways, so as to build up the waste into a tip or dump about 60 ft. wide at the top. When it is used, it is not necessary to advance the head of the main conveyor so often as when this is used directly for dumping, for the shuttle itself can be drawn back when a new position is taken up, and gradually pushed forward as the ground is covered.

A conveyor of the simple type described in this article can readily be incorporated in excavators and dredgers. The Lobnitz dredger described on page 201 of the *"M.M."* for April last is an example. This dredger works on the River Pek, in Yugoslavia, taking up gold-bearing gravel from which the metal is washed. The tailings are carried beyond the stern of the dredger by a Mavor and Coulson conveyor carried on a boom.

A small portable conveyor of this type also has been designed. This is mounted on wheels and can be made up in any length up to about 65 ft. From it has been developed what is known as the Joy Loader, which is used for such purposes as picking up iron ore dumped from railway wagons and loading it into crane skips. No hand shovelling is required, two gathering arms sweeping the material on to the belt.

A Holiday in Finland

Summer Outings on Lakes and in Forests

By L. Hugh Newman

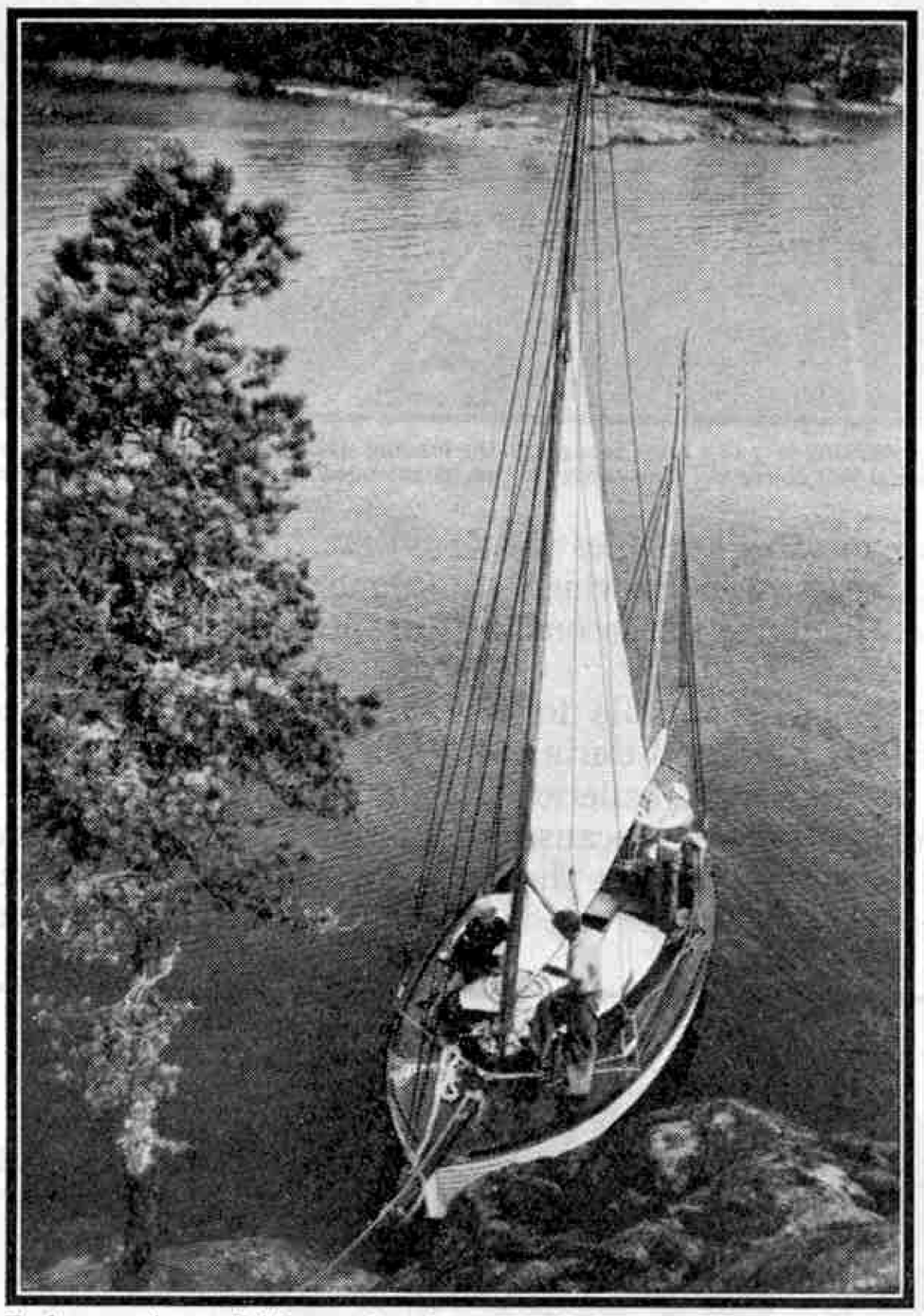
HOW would you like to live in a country where the school summer holidays are three months long? In Finland, a land of pines and firs, all the schools break up for June. Only the unlucky ones who fail in their "tests" must work until midsummer, and thus have the misfortune to lose part of the wonderful long holiday to which every boy in the country looks forward eagerly.

Most families in Finland have two homes, a flat or house in town, and a chalet out in the country. These country houses often are built on the edges of lakes or along the coast, and on 1st June trains and coastal steamers are crowded with excited schoolboys and their harassed parents on their way to them with loads and loads of luggage. On arrival the chalet must be "opened up," the boats painted and launched, the fishing tackle overhauled and a thousand and one odd jobs completed.

As soon as the country home is in working order again, the glorious summer life begins in earnest, with the long warm sunny days, and nights so light that lamps are never needed. It is possible to read a book out of doors until late in the evening, if one doesn't mind being bitten by crowds of mosquitoes.

Once a week everyone gets up very early in the morning to go to the village market, which is the only means of filling the larder out in the depth of the country. Each village has its weekly market on a fixed day, and people often have to travel 20 to 30 miles to purchase their stores. Those who live near the water naturally travel by boat. Some row, but most travel by motor-boat. The outboard motor is very popular in Finland and nearly every household possesses one. Peasants arrive in pony traps, and from the manor houses, or "Herrgards," as they are called, the wealthy landowners come in their high powered cars, which make a weird contrast to most things in this rather primitive country. It is an interesting fact that over 60 per cent. of the cars in Finland are of more than 40 h.p., for motor taxation is on lines entirely different from that in Great Britain, and Finnish motorists are not taxed on the horse power of their cars.

The principal things bought at market are fresh meat and fish. It may seem strange that people in a country with so many lakes and such a long coast-line buy fish, but much of the water is privately owned and the fishing rights are jealously guarded. Herrings, live pike and perch are commonly seen on market day, and there is also a fish called "simpa" that has a large head and is hideous, but which in spite of its looks makes delicious soup. The herrings, called "stromming" in Finland, are sold by weight in string bags that look like great silver balls when they are hauled out of the crates. The pike have to be knocked over the head before being weighed, and a fisherman's wife selling one is seen in the upper illustration on the opposite page.



Early morning activities on board a yacht during a holiday in Finland. Finnish boys often make long sailing trips among the islands off the coast.

Later in the summer the trestle tables of the market stalls are weighed down with wild berries, which the peasants gather in the forests to sell to those who are too lazy to pick for themselves.

Many Finnish boys learn to sail yachts at a very early age, and go for long trips along the coast. All along the southern coast of the country there are thousands of islands, ranging from mere granite rocks to large tree-covered isles. There the young yachtsmen anchor at night, and it is easy enough to pitch a tent under the trees if the boat is not large enough to sleep in.

Most of these islands are uninhabited, but sometimes there is a fisherman's cottage or a small farm, or even a flock of sheep taken over to graze for the summer. Clumsy old windjammers sail along, loaded down to the water-line with logs cut in the forests during the winter. The skipper and his family live on board through the summer, and often boys on their holidays delight in helping to load these ships and at the same time catch a glimpse of the life of these "water gypsies." Much of this timber is sent to England as props for coal mines.

Every village has its sports ground. This is not a village green as we know it, but a sandy track where boys can run and practice long and high jumping, and it is seldom empty. A stadium is in course of construction at Helsingfors, the capital, and Finland has great hopes that the Olympic Games will be held there in 1944. The athletes of Finland are famous,

and the exploits of such runners as Nurmi and Iso-Hollo are known everywhere.

Many boys whose parents have no country houses spend their holidays at farms up country. As the summer season is so brief, there is plenty of work to be done, especially during hay-making. The peasants pile the hay on long poles or wooden tripods so that the wind can blow through and dry it quickly. The machines often work all night in the fields in order to avoid the almost tropical heat that prevails during the day at this time of the year.

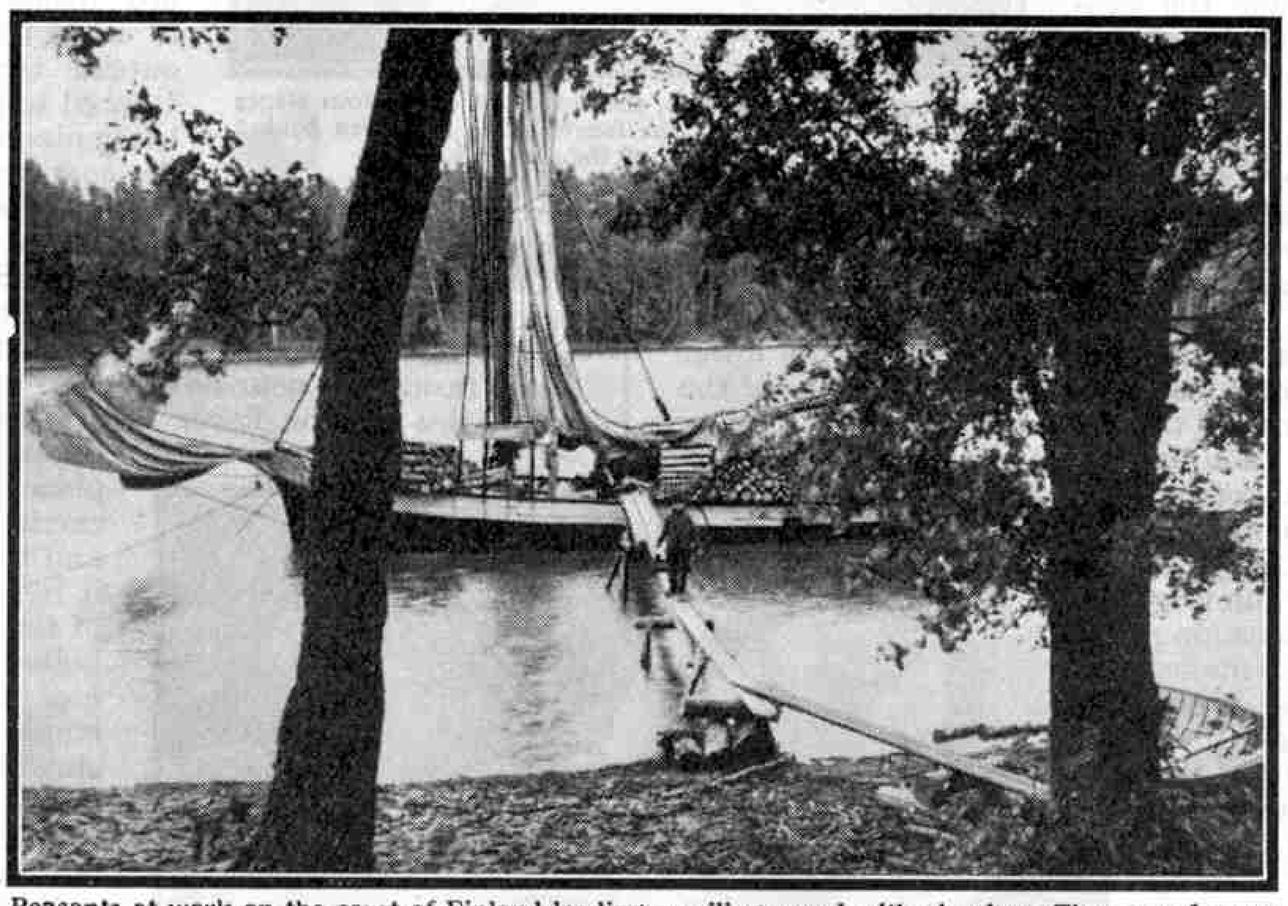


A busy scene in a Finnish village market, to which people flock from the surrounding country. On the right a pike is being weighed on a kind of steelyard.

Finland is a country of strange contrasts, however. Sometimes, just before mid-summer, what is called an "iron night" descends upon the land. This is marked by severe frost, which might work havoc among the young corn. In the past these terrible frosts used to cause famines, when the peasants were compelled to resort to bread made of ground pine bark. Just as fruit growers in England take steps to protect blossom from frosts, so the Finns now always prepare for these iron nights. It is one of the strangest sights in the country to see the bonfires blazing round the cornfields on nights when frost is expected, and to watch the farmers swinging long ropes across the top of the growing corn in order to keep the air in circulation.

Famine is unknown to-day, largely owing to the fact that wheat can be imported from abroad, but bread still remains one of the chief items of diet amongst the poorer classes, because they are able to grow their own rye and barley, and sometimes wheat, in the clearings round their farmsteads. The peasants only bake three or four times a year, and they never use any yeast in their "sour bread," as it is called. Pure rye flour is used, and the dough is mixed in the same wooden tub as their forefathers used before them. Nobody ever thinks of washing out the family dough tub after the grand bake, but there is a reason for this, as the bread will not rise unless some of the bacteria causing fermentation are left in the tub to act upon the dough. After several hundred flat round loaves have been baked, holes are punched through their centres and they are hung on long poles across the ceiling to dry and harden.

My first Finnish "bath" was an experience that I shall never forget. Throughout a Saturday I took my turn at stoking the bath house boiler with great logs until in the evening the huge metal chimney above the boiler glowed brightly in the dimly lit room, and wave after wave of lovely pine scented steam mingled with the bitter smoky smell of smouldering wood. As I entered, a blast of hot steamy air met me. I scrambled on to one of the wide shelves that lined the walls, and lay back gasping. Someone threw me a bundle of birch twigs and I flailed myself with them, stirring up air currents and setting the steam moving all round my head. Then buckets of cold water were flung on the red hot chimney, and our bath really started! The perspiration poured off my body, and I could not see my neighbour for steam. A thoroughly good soaping and a rub down with a rough towel was followed by a plunge in the deep cold lake outside the door.



Peasants at work on the coast of Finland loading a sailing vessel with pine logs. These are for use in making railway sleepers or pit props, and are exported in large quantities.

Swimming is a national pastime, and swimming schools are held in most villages along the coast. Those who attend them can get a degree, and become either bachelor or master of swimming according to the tests passed. The reward is a wreath of oak leaves and a small badge that can be attached to a bathing costume. A boy who wins a wreath hangs it over his bed, or frames it round a photograph of himself.

Undoubtedly the most lovely part of Finland is along the southern coastline, as the pine forests run right down to the water's edge, and on still moonlight nights the reflection of the trees in the water completes a perfect picture. When dawn comes a heavy mist usually hangs over the water, which the Finns picturesquely call "Sun-smoke." The mist wreaths move like giant curtains among the pines and firs, and when the Sun breaks through they disappear like magic.

A Model Theatre Operated by Meccano

Sliding Tower of Four Stages

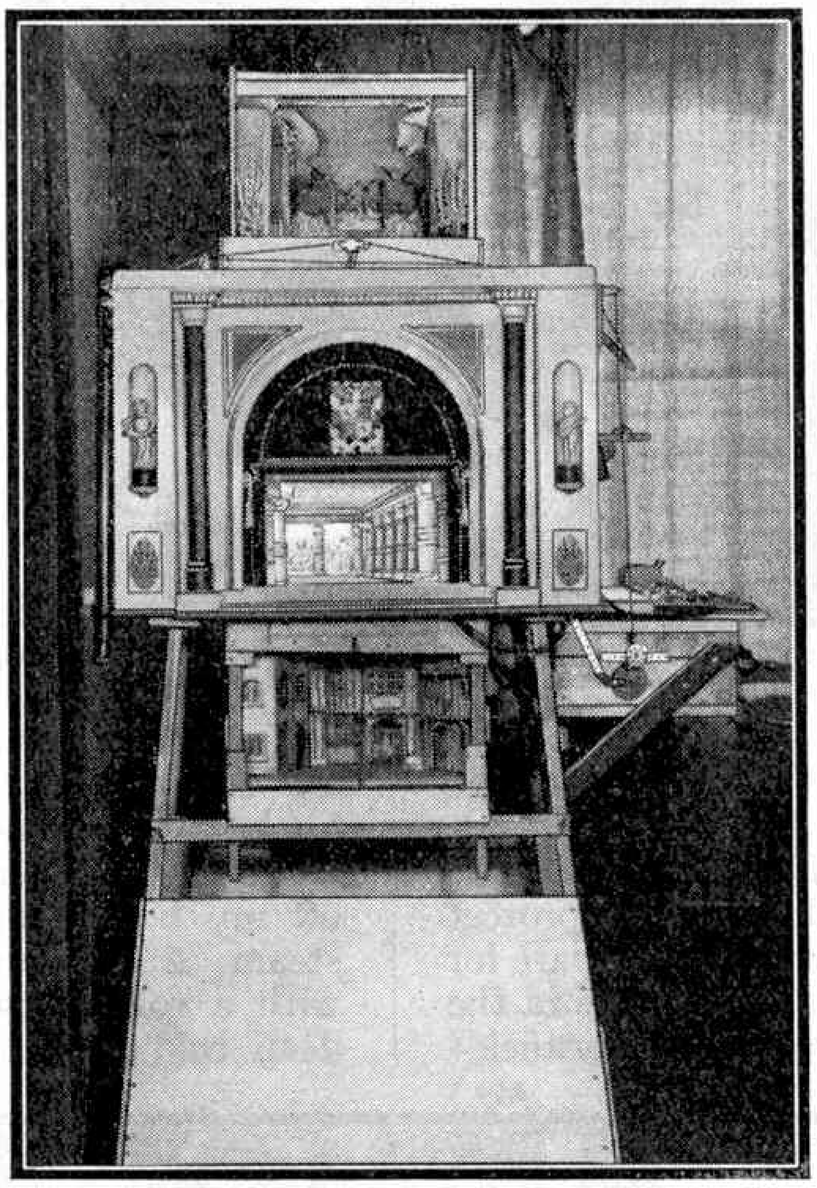
By Norman Hunter

THE model theatre illustrated on this page is equipped with a tower of four stages, each of which can be made to sink into position behind the proscenium opening in turn, thus permitting a rapid change from one full and elaborate setting to another. There is also a separate revolving stage that can be slid into position on any of the four stage levels, and used for further quick changes as well as for the provision of special effects. Both these stage movements, and in addition the raising and lowering of the curtain, are carried out by means of Meccano Electric Motors and Meccano gearing.

In order to accommodate the tower of stages when completely lowered, the proscenium and its framing are mounted on a stand, so that the stage level is about three feet from the floor. This is a convenient height for persons seated at a little distance from the theatre to view what is taking place on the stage.

The proscenium opening is 15 in. wide and 9 in. high and the four stages are spaced out, one above the other, so that there is a distance of 12 in. between each pair. Each is held in a frame of wooden strips running vertically at each corner, while cross braces at the sides and back at the level of each stage hold the structure firm. The tower slides up and down in four wooden runners with L-shaped section. These runners are permanently fixed to the theatre framework.

The tower of stages is moved through the medium of a length of Meccano chain. One end of the chain is fixed to the theatre framework, immediately under the proscenium and exactly in the centre. From there it is taken round two pulleys screwed under the lowest stage, passing from the front to the back of the theatre. It is then carried up behind the tower, and over another pulley, screwed to the framework at normal stage level, to the driving mechanism, through which it passes to three pulleys on a counterweight and then up to a point at the side of the framework again.



The complete model theatre, showing three of the four stages set with different scenes. The fourth stage is hidden behind the upper part of the proscenium.

The counterweight and its three pulleys are seen in the lower illustration on the opposite page. The mechanical advantage of the pulley system operates in favour of the sinking stages, thus making necessary a counterweight that is much heavier than the actual weight of the stages. This arrangement was rendered necessary by the fact that otherwise the counterweight, running on its rods, could not be given as long a drop as the stage tower had to make. The loss of efficiency, however, is not important, as the counterweight does not have to equalise the weight of the stages, but has only to counteract some of it in order to avoid putting too much strain on the driving mechanism.

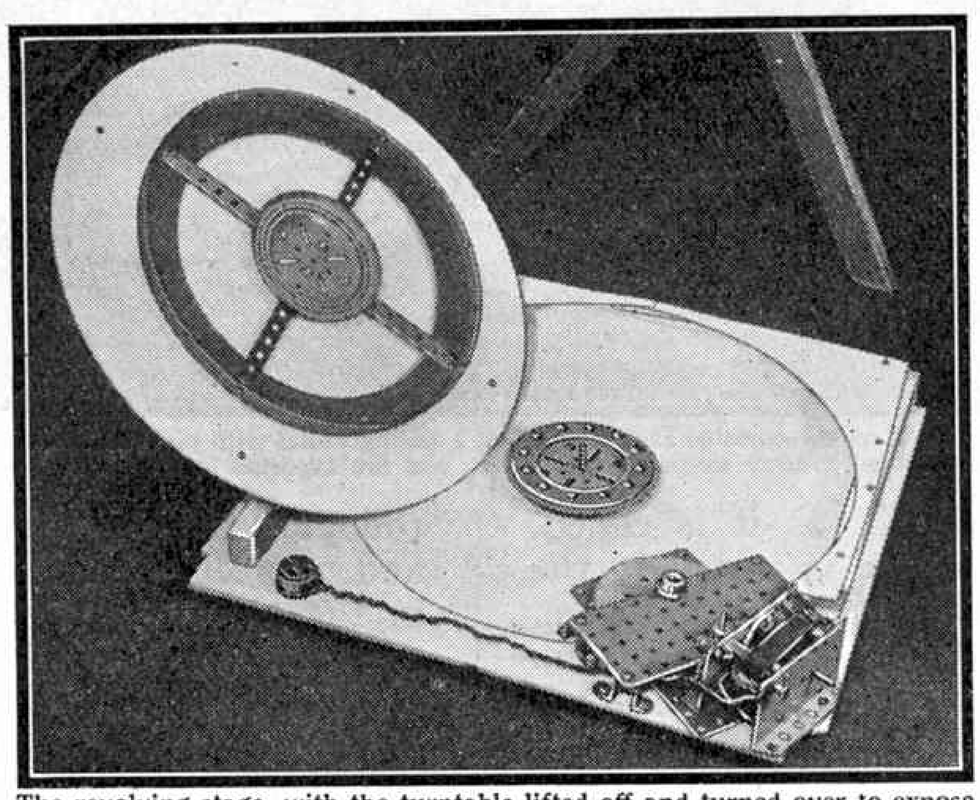
I should explain at this point that the stages are driven down only, that being the only direction in which they are required to operate during a performance. A free-wheeling device is fitted to the driving gear, so that the stages can be raised again by hand. Reversing gear or a reversing motor therefore are unnecessary, and the stages can be slid up quickly for re-setting.

The system of operation should now be clear. The tower of stages is held suspended in its runners by a chain that is controlled by a system of gearing. When the current is switched on, the chain is paid out and the tower sinks by its own weight, the counterweight system checking any tendency to race down and strip the gears. Current is supplied to the Motor through a Meccano 20-volt Transformer with speed control, and the rate of sinking of the stages can be regulated to suit the needs of the performance. The movement is made at high speed for a quick change while the lights are out, or more slowly when some special effect is to be produced in view of the audience. Thus the sinking of a ship can be well represented. Similarly, in a performance of "*Jack and the Beanstalk*," the beanstalk and cottage can be shown sinking slowly down as Jack climbs up, and clouds with the giant's castle are seen coming into view from above. This indeed is an effect that would be very difficult to produce in even a large theatre.

The sinking stage driving mechanism is shown in detail in the upper illustration on the opposite page. A Meccano Electric Motor E120 is bolted to a framework of rectangular plates within which the chain operates, and to its driving spindle is fitted the small Pinion Wheel supplied with the Motor. The Pinion Wheel drives a 57-teeth Gear Wheel fixed to a Rod passing through the holes in the frame of the Motor, and to which is fixed a ½" Pinion Wheel that meshes with a 133-teeth Gear Wheel. The Rod passes through the sides of the gear box, inside which there is a 1" Gear Wheel 31 fixed to the Rod, and a Pulley Wheel outside the gear box on the left also is secured to it, a short piece of Spiral Spring being placed between the Pulley Wheel and the gear box side. This is the free-wheeling device for enabling the stages to be raised or lowered quickly by hand independent of the Motor and gearing. On pressing the Pulley Wheel inward against the Spiral Spring the large Gear Wheel is forced out of mesh with the ½" Pinion.

The 1" Gear Wheel, already referred to, on the upper of the two Rods inside the gear box meshes with another Gear Wheel of the same size on the lower Rod. These two Gear Wheels are used because there is not sufficient room to place the 1" Sprocket Wheel that carries the chain on the upper Rod, and they are of the same size because it is not necessary to alter the speed of the drive at this point. The handle bolted to the large Gear Wheel is for use in emergency. It enables the stages to be lowered slowly and steadily by hand if the Motor should fail to operate owing to a break in the wiring, or from any other cause, during a performance.

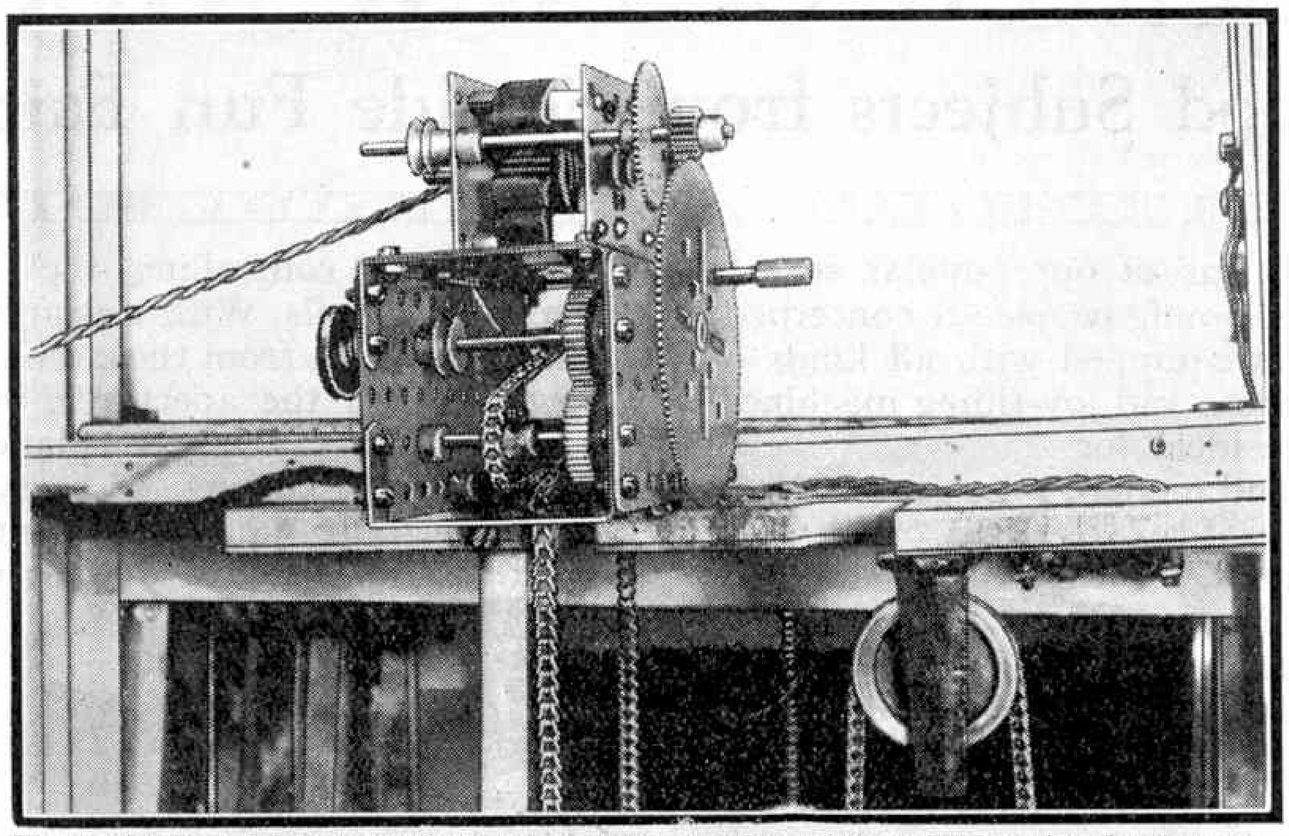
Now we come to the curtain and its mechanism. This is very simple. The curtain is a piece of plywood sliding loosely in wooden grooves behind the proscenium. A piece of velveteen with a length of fringe sewn to the lower edge is carefully pleated vertically, and glued to the plywood foundation. Two cords are attached to the centre of the top edge of the curtain. One cord passes through a pulley immediately above, to the



The revolving stage, with the turntable lifted off and turned over to expose the driving mechanism.

right as seen from behind the stage, over a second pulley and so to a counterweight sliding in a vertical tube. This counterweight is a short length of metal tube containing lead shot, the quantity of which is so adjusted that the curtain just drops easily when it is pulled up and then released.

The second cord from the curtain passes through a pulley directly above and thence goes to the left of the stage, over another pulley and down to a spindle driven by a second No. E120 Electric Motor, that when in motion winds in the cord and so raises the curtain. Some form of reversing gear is required in order to enable the curtain to be lowered at varying speeds. In my theatre I use the reversing gear No. S.M.52 described in the *"Meccano Standard Mechanisms Manual."* The motor and reversing gear, well lubricated with Meccano Grease, are enclosed in a box of half-inch wood that is well padded inside with thick sponge rubber cut from an old bath mat and serves to deaden the noise and vibration of gears and motor. Silent raising and lowering of the curtain is always advisable in a theatre, even though the stage movements may be more audible. The box containing the lifting gear is screwed to the underside of the stage switchboard.



The mechanism used to lower the tower of stages. A quick release is fitted so that the stages can be raised by hand at the end of the fourth scene.

The Motor for operating the sinking stages and the curtain Motor are both wired to the variable speed 20-volt tappings of a T20A Transformer, but a two-way switch is inserted so that only one of the motors can be connected at a time. The speed controller on the Transformer thus regulates the rate of movement of either the curtain or the sinking stages, and of course during a performance it is never necessary to operate both these movements together.

A third E120 Electric Motor is used to operate the revolving stage, which is an entirely separate unit, and can be placed in position on any of the four stage levels. When so placed it raises that particular stage level a couple of inches, but this is compensated for by lowering the stage tower a corresponding distance.

The construction of the revolving stage is shown in the lower illustration on the opposite page. The turntable is a disc of plywood 15 in. in diameter, and it has screwed to its under surface a Meccano Ring Frame, across which are bolted Perforated Strips that hold the upper section of a Meccano Ball Bearing. The lower portions of the Ball Bearing are fitted on the under framework of the stage. A short Rod fixed to a Bush Wheel, which is screwed under the wooden framework, fits into the centre of the turntable to prevent it from being forced sideways off its bearings.

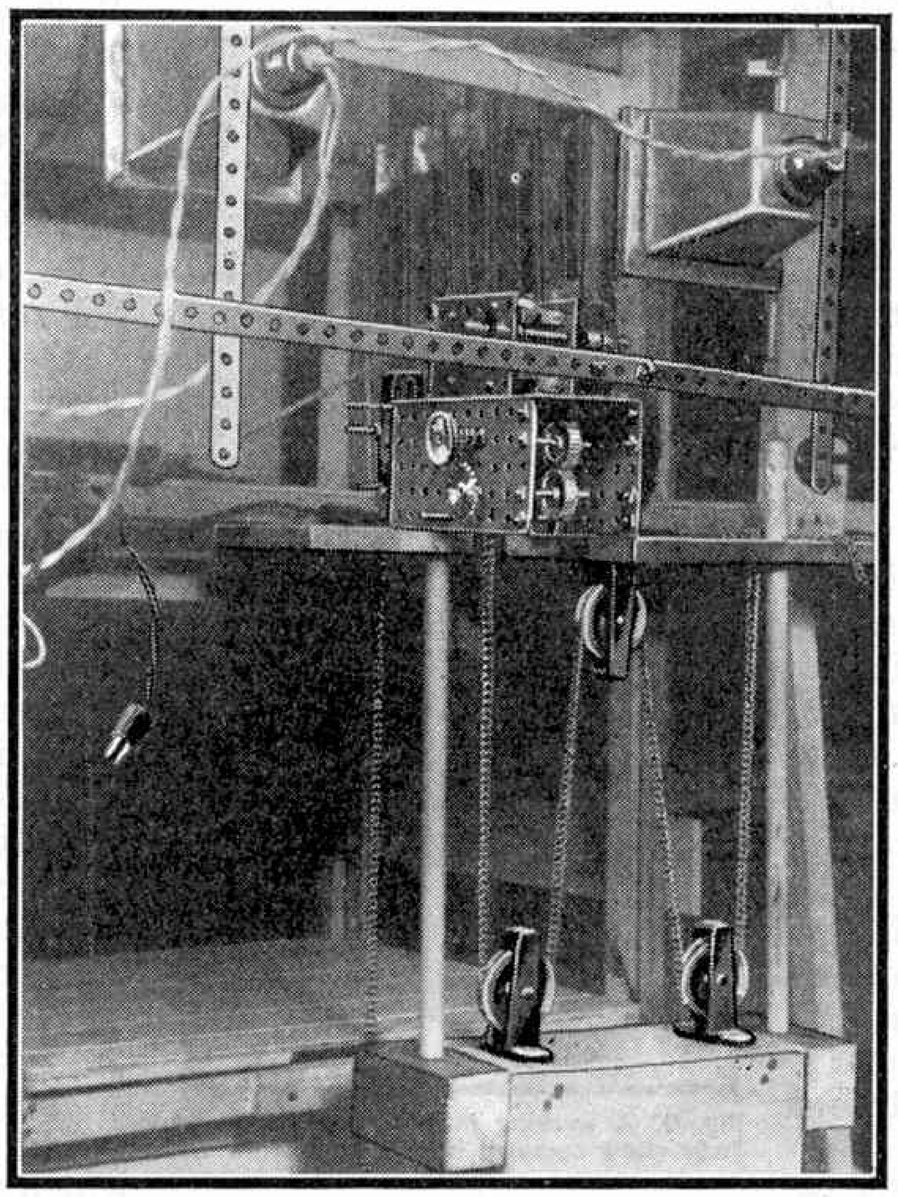
The turntable is driven by a combination of gearing and friction. The motor is fitted with a Worm Wheel, which operates a ½" Pinion on a vertical Rod passing through a Perforated Plate. A second ½" Pinion on the same Rod under the Perforated Plate engages with a 133-teeth Gear Wheel on a Rod projecting through the upper Plate and carrying a Collar on which is stretched half of a rubber gas tubing connection. As this rubber connection revolves, it presses against the side of the circular metal frame of the turntable and so rotates the stage. There is no speed control, as it is not necessary to vary the rate of movement of this stage, and the E120 Electric Motor is driven by current from the fixed 20-volt tapping on the Transformer. Small pads of sponge rubber are glued under the framework of the stage to subdue vibration as much as possible.

It is impossible to have a revolving stage of adequate size for the proscenium opening owing to the presence of the frame that carries the tower of stages. For an opening of 15 in. the revolving stage should be at least 25 in. in diameter instead of the 15 in. provided. The proscenium is fitted with "tormenters," or black side wings that can be pushed in or drawn back, however, and a "teaser," that is a black top piece that can be raised or lowered. By these means the size of the proscenium opening can be reduced as required. This is useful not only for use with the revolving stage but also with small interiors, such as cottages, which ought to be less than those of palace sets.

On the right of the stage is a distribution box for special lighting, the switches for the flash lamp bulbs used being operated from the 3½-volt tapping of the Transformer. Switches and dimmers are provided for the back lighting and other special lights worked straight off the mains for scenes in which very powerful illumination is needed, such as a sunny day in a village street.

The lighting is arranged for red, white and green lamps, each set of which has its own series of switches, and dimmers are connected respectively to the three circuits of the lamps of different colours. Meccano Resistance Controllers by the Transformer are used as main dimmers for controlling groups of different coloured lights.

The Meccano Strips seen in the back stage view on this page form a rack upon which slide two lamps in reflectors for throwing illumination from the back to light up transparencies in certain scenery. Each lamp can be raised or lowered on its vertical strip, to which it is attached by means of a little brass end stop, of the kind sold with flat curtain rail, that is soldered to it. Another of these stops soldered to the top of the Meccano Strip permits the entire strip and its reflector to be slid from side to side. Thumb screws in the stops can be tightened to hold the reflectors in any desired position so that light may be projected from below for sunrise effects, from above for moonlight, and so on.



A back stage view. The Sprocket Chain supporting the stages passes round Pulleys supporting the counterweight.

Miniature actors for use in this model theatre are best cut from stiff cardboard and fitted into little tin or wooden holders on the end of thin blackened wires. They can then be pushed on or off the stage easily, and moved about to suggest the action conveyed by their words. Very effective movements can be made in this way. For instance, two characters may meet in the centre of the stage. As they talk a third comes on behind and suddenly breaks into the conversation. The first two characters are quickly jerked apart, to give an effect of surprise.

A play with plenty of change of scene, such as one of the favourite pantomime stories, should be chosen for presentation, and should be divided into two acts. The interval, during which gramophone music should be played, then gives time to re-set the stages and thus it is possible to have twice as many scenes as if the play were run straight off in one act. Each scene should be short, with suitable music, and some effect such as a sunrise or sunset, or a transformation scene of some kind, should be included in each. Even a simple movement such as the sails of a scenic windmill going round will be found effective. The first scene should be a big elaborate one and the play should end with a better one.

The lights in the room should be put out, and the footlights switched on before beginning a performance. A short overture played in the darkness will enable the aud ence to adjust their minds and eyes to the proportions of the stage.

In Search of New Models

Good Subjects from Seaside Fun Fairs

OUTSTANDING attractions of our popular seaside resorts, at least so far as young people are concerned, are the wonderful fun fairs equipped with all kinds of fascinating amusement devices and joy-riding machines. Many of these devices are ideal for reproduction in Meccano, and model-builders who are able to visit a fun fair during their summer holidays will find it a splendid source of new ideas that they can turn into practical form on their return home.

When visiting a fun fair, model-builders should make notes or a simple sketch of any machines or mechanical games that appeal to them, keeping a look out for any that have ingenious movements as well as those of attractive appearance. In most cases it is the movement that provides the fascination, and really good working models should result.

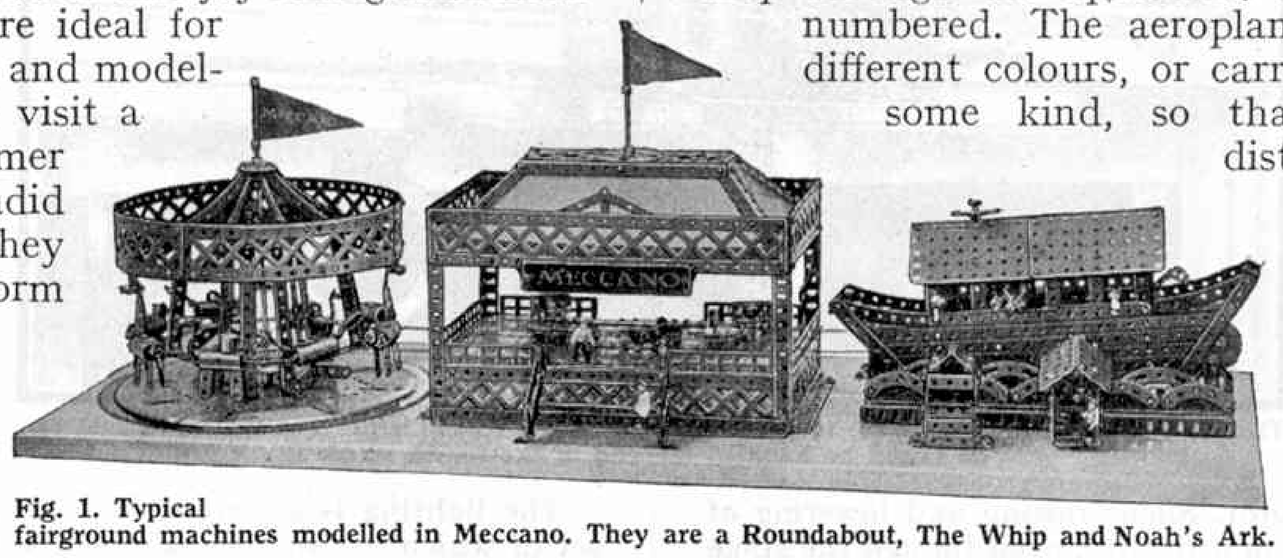


Fig. 1. Typical fairground machines modelled in Meccano. They are a Roundabout, The Whip and Noah's Ark.

A popular attraction in most pleasure grounds and amusement palaces is the aerial bombing game, a model of which is shown in Fig. 3. This consists essentially of a central pillar around which revolve a number of aeroplanes. Each aeroplane carries a steel "bomb" that is fitted with a sharp point and can be released by pressure on a button. A numbered target is fixed to the base of the machine and as the aeroplanes revolve each competitor releases his bomb and tries to make a good score. The competitor registering the best hit wins a prize.

Only two aeroplanes are included in the model shown in Fig. 0, but more can easily be added if sufficient parts are available. The aeroplanes are suspended from the ends of beams consisting of two 12½" Angle Girders bolted together in the shape of a U-section girder. Each aeroplane carries inside its fuselage a Magnet Coil, and while this is energised the "bomb," which is a 1" Rod, is retained in the central bore of the Coil. When the control buttons are pressed, however, the electric circuit is broken, the Coils are de-energised and the bombs fall.

Current is fed to the Magnet Coils by means of two rotary collectors, which can be seen at the top of the Rod supporting the beam. Each collector consists of a Bush Wheel bolted to a Wheel Flange and separated from it by Insulating Washers. Pendulum Connections bent to shape form brushes for the collectors.

As an alternative, steel balls can be used instead of Rods for the bombs. In this case the base of the machine is covered in, but a small aperture is left in front of each press-button controlling the current passing through the Magnet Coils. With this arrangement the object is to release the balls from the circling aeroplanes so that they drop through the apertures, which should be suitably numbered. The aeroplanes should be painted in different colours, or carry identification marks of some kind, so that each competitor can distinguish his own machine.

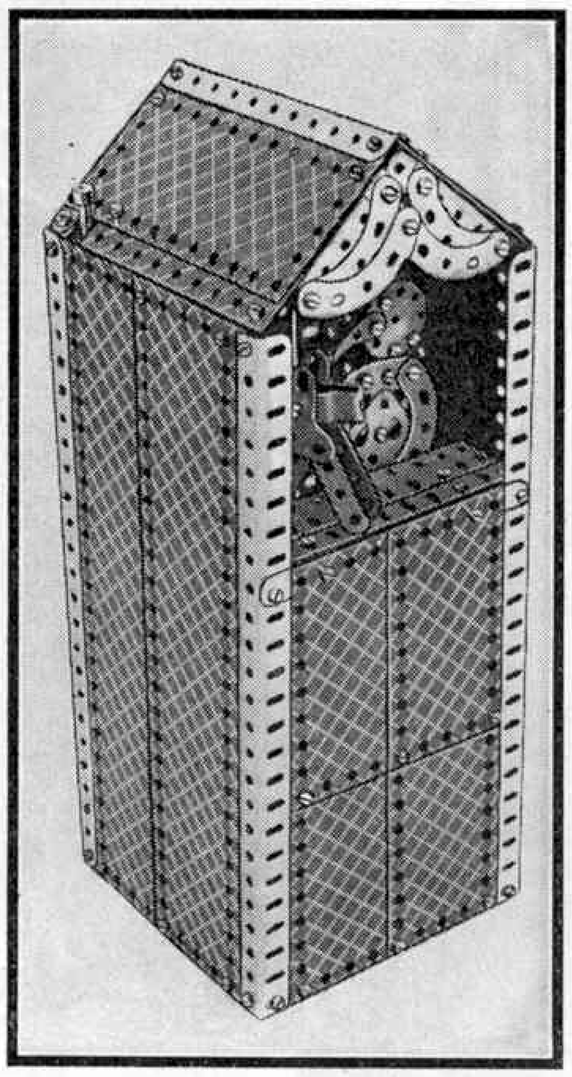


Fig. 2. A working model of a Punch and Judy show operated by a No. 1 Clockwork Motor.

Among the mechanical games are usually to be found various types of miniature shooting alleys. Generally these are enclosed in glass cases, and are operated by placing a coin in a slot. In one game of this type that is particularly popular the competitor has to hit a target by firing a small gun pivotally mounted in front of the machine. The bullet is a heavy steel ball, and considerable skill is required to register a "bull's eye" owing to the difficulty of calculating the trajectory of the missile. A game of this kind is easy to reproduce in Meccano, yet provides ample opportunity for the exercise of ingenuity and the introduction of interesting variations.

Another type of mechanical game is one in which a ball is projected by a powerful spring gun into a short metal spiral chute placed vertically. When the ball reaches the end of the spiral it strikes a steel pin and falls through a set of steel prongs, which cause it to travel downwards through a very erratic path. As the ball emerges from the pins the operator endeavours to catch it in a small cup, which is moved backward and forward by turning a knob.

This type of game is not difficult to construct in Meccano, provided care is taken in bending the spiral. The best way of making this is to curve several Strips and then clamp them in the ends of Cranked Bent Strips. This method of construction eliminates the use of bolts, the heads of which would obstruct the passage of the ball. Other types of games include automatic bagatelle tables, football and cricket matches, and "Driving Test" machines. In the latter a sheet of paper, on which is drawn a tortuous roadway, is fastened to a revolving drum. The operator has to "steer" a pen along the roadway by means of a wheel in front of the machine.

Most fair grounds include an electric shocking machine. This is simply a powerful "medical" or induction coil arranged to operate in conjunction with a "penny-in-the-slot" mechanism. When a coin is inserted electric current to the coil is switched on, and the supply continues for a

pre-determined period. In a model of this kind good use can be made of the Elektron Shocking Coil. The slide of the Coil, by means of which the intensity of the "shock" is regulated, can be connected to a lever so that it can be operated from outside the model. The automatic coin mechanism is arranged so that when a coin is placed in the slot it falls on to a Flat Plate studded with two separate sets of Insulated 6 B.A. Bolts, which serve as contacts. The bolts are wired in parallel and connected to the terminals of a 6-volt accumulator or Transformer.

When the coin falls across the bolt heads it completes an electric circuit supplying current to the Shocking Coil and also to an Electric Motor. The Motor is arranged to drive a small brush slowly across the face of the Flat Plate, which sweeps the coin off the contacts and so breaks the circuit.

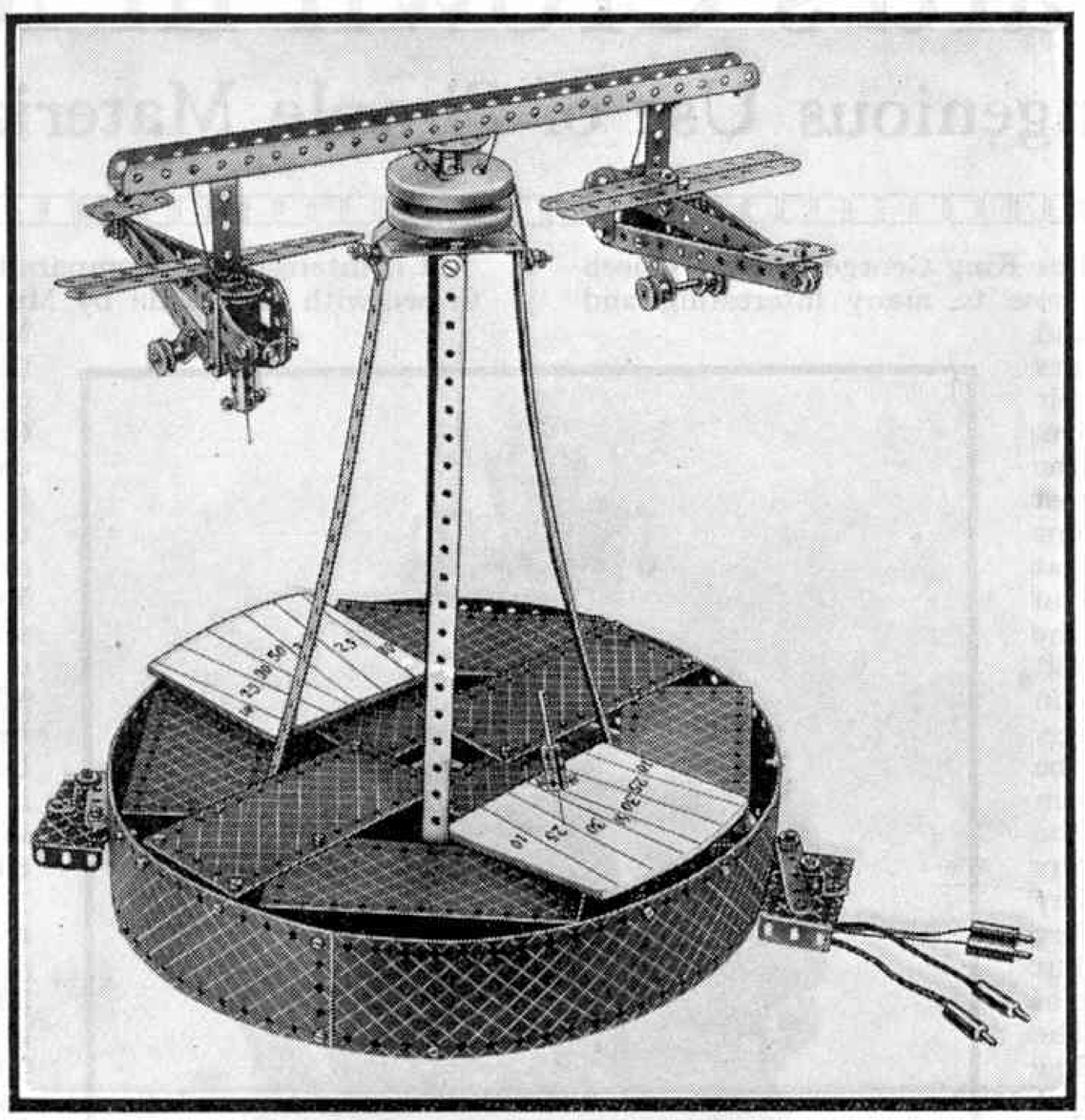


Fig. 3. A model of an exciting aeroplane bombing game that is a feature of most fun fairs. "Bombs" are carried under the fuselages of the aeroplanes and are released to fall on numbered targets as the machines revolve.

Model-builders in search of subjects of a more simple type than those already referred to will find the always popular coconut shy suitable for their attention. This is essentially a game of skill, in which the man with the best aim wins the prizes. In a simple alley suitable for construction with a small Outfit the coconuts can be represented by marbles, balanced on the ends of Double Angle Strips bolted to a suitable base. Bolts could be used as substitutes for the showman's wooden balls. Alternatively, a small ballista or catapult could be used to good effect.

The "Drop the Nigger" stall is always a great attraction wherever it appears. Here is to be seen a man seated on a stool, which is supported by a rope above a shallow tank of water. Competitors throw balls at a target and whenever a "bull's eye" is made the thrower has the "pleasure" of seeing the unlucky "nigger" precipitated into the water.

A Meccano model of this sideshow amusement is illustrated in the Instructions Manual for Outfits F/L. The operating mechanism consists of a Strip connected by a lever to the bull's eye. A length of Cord supporting the Meccano nigger above the tank is looped over the end of the Strip. When the bull's eye is hit, the Strip is jerked and the Cord slips off it, allowing the nigger to drop into the tank.

In the fairground proper there are the big wheels, high-flyers, roundabouts, cake walks, scenic railways and many other joy-riding machines, all of which make good subjects for models. A large model of a big wheel is shown in Fig. 4. The wheel itself is built up from overlapping 12 " Strips and is braced by Angle Girders, and the cars are supported on Rods mounted so that they are free to turn. The Motor is concealed beneath one of the platforms, and the drive is taken to the main shaft by Sprocket Chain.

The model might be made additionally interesting by fitting electric lamps inside the carriages, current for which could be collected by brushes making contact with slip rings.

Really fascinating models can be arranged by grouping several machines together on one base so as to represent a corner of a fun fair, and driving them with a single Electric Motor concealed below the baseboard. An arrangement of this kind is shown in Fig. 1. Considerable realism can be added to such a scene by the use of Dinky Toys figures. The Horses in the Farmyard Set can be used in small models of roundabouts, where it is difficult to construct animals of sufficiently small size from Meccano parts, and by adding various figures to represent the showmen and spectators a really life-like effect can be obtained.

Most modern fun fairs include a special section devoted to the amusement of very young children. Here the favourite item is the Punch and Judy show. This well-known side-show has been a laughter-maker for generations, and those on the look-out for a really popular model cannot do better than construct a working model of it. This would delight a younger brother or sister for hours on end, and is quite simple to construct. A typical example is shown in Fig. 2. "Punch" is bolted to a 12½" Strip pivoted on a ⅜" Bolt underneath the "stage." A No. 1 Clockwork Motor is placed in the base of the structure at the rear, and the drive is taken from the main gear wheel by a ½" Pinion fastened on a 2½" Rod. The Rod carries a Bush Wheel, to which is pivotally attached an Eye Piece. The lower end of the 12½" Strip to which Punch is fixed slides in the Eye Piece, so that when the Motor is started, the Strip and Punch are moved from side to side. Several other figures each operated by a simple system of levers can be included if sufficient parts are available.



Fig. 4. A splendid model of a big wheel. The model is driven by an Electric Motor housed in one of the platforms.

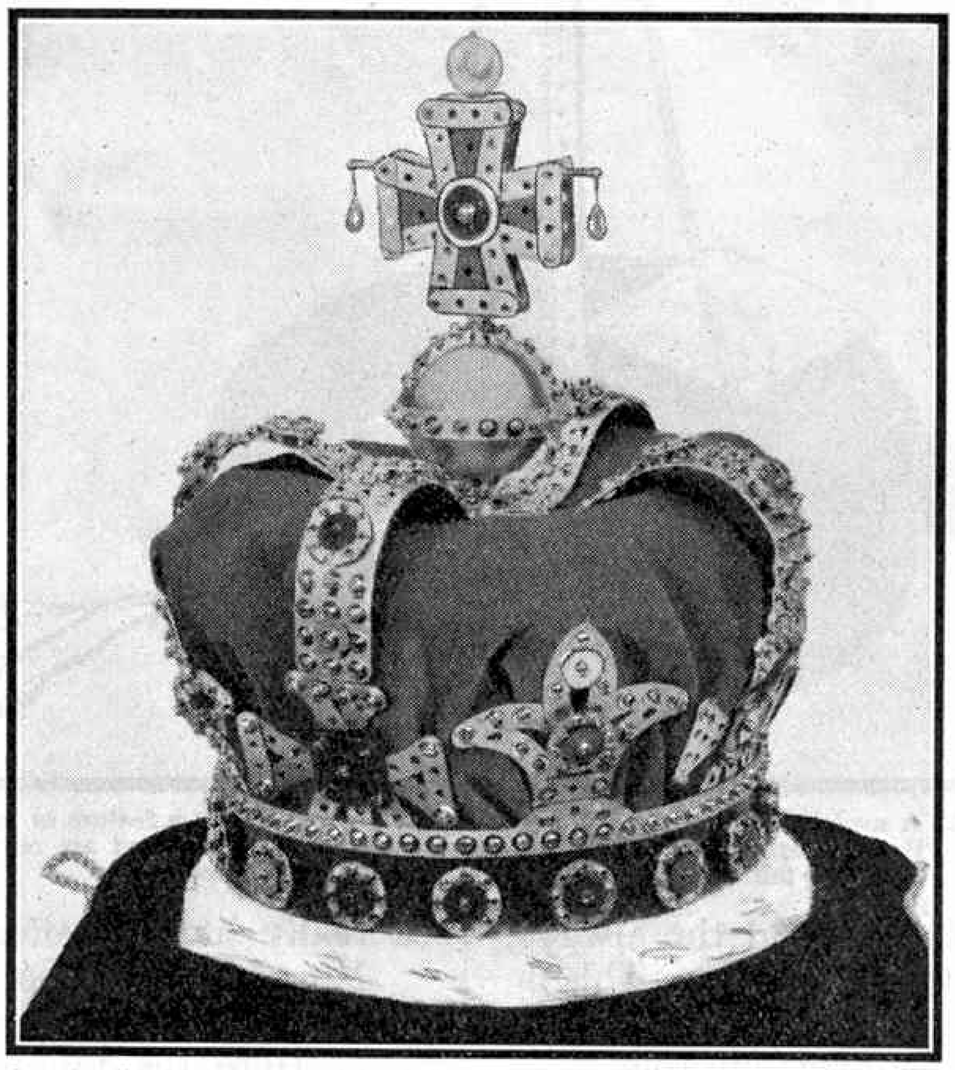
At many pleasure parks displays of daring motor cycle riding round the inside of a huge wooden cylindrical structure are given. Such a show provides an unusual and attractive subject for a working model. A suitable cylinder can easily be built from Flexible Plates and the motor cycle can be quite simple, such as that illustrated and described in this month's "New Outfit Models" on page 422.

St. Edward's Crown in Meccano

Ingenious Use of Simple Materials

THE Coronation of their Majesties King George VI and Queen Elizabeth on 12th May gave rise to many interesting and attractive schemes of decoration, and corporations and other public bodies vied with ordinary people in their efforts to make these effective. Meccano of course took a share in the rejoicings, and perhaps the most effective of all Meccano contributions to the decorative schemes of that wonderful week was a fine model of the St. Edward's Crown used in the Coronation ceremony. This was built in our model room, and is shown in the upper illustration on this page.

At first glance it would scarcely be thought that a satisfactory crown could be made of Meccano, but the ingenuity of our model-builders triumphed over all difficulties. They were not satisfied even when they had built this splendid model, but went on to produce a complete set of Coronation regalia in Meccano. The entire set was displayed in the window of the Meccano Showroom in Regent Street, London, where it attracted crowds of people who were surprised and delighted by the wonderful realism and glow.



A splendid Meccano model of St. Edward's Crown, with which King George VI was crowned on 12th May.

With the exception of the orb at the top, one or two pearl ornaments and the lining, the crown consists entirely of Meccano parts. It is 17 in. high, and 40 in. round the base. The imitation jewel clusters in the holes in the Flexible Plates forming the circular band are red $1\frac{1}{4}$" Discs, with coloured $\frac{3}{4}$" Discs fitted in their centres. The four fleurs-de-lys are made up of $2\frac{1}{2}$" Cranked Curved Strips and the centres of the crosses between them consist of green $1\frac{1}{2}$" Strips built into a square. The arches are of Formed Slotted Strips, placed three abreast, and their tops meet on a Face Plate, to which they are bolted.

The orb is a gilded rubber ball about $2\frac{1}{2}$" in diameter, with $5\frac{1}{2}$" Strips bent round it. Through it passes an 8" Rod carrying the large cross, which is built up in two sections, placed one on each side of the Rod and bolted together. Red Discs $1\frac{1}{4}$" in diameter fill in the spaces between the 4" Curved Strips of the arms of the crosses, and 1" Loose Pulleys form the centres. The two drop pearl beads, representing the earrings of Queen Elizabeth, are fastened on to $\frac{3}{4}$" Bolts by fine wire, and the large pearl bead above the cross is glued to the protruding piece of the 8" Rod.

Nickelled Bolts of the type included in Aeroplane Constructor Outfits are used throughout, and greatly improve the appearance of the model. The $\frac{3}{4}$" Discs and some of the Bolt heads in the jewel clusters were specially lacquered red, green and blue to represent rubies, emeralds and sapphires, and a piece of white fur with black specks in it forms a satisfactory representation of the ermine of the real crown. Crimson velvet is used for the lining and is held in place by a Ring Frame.



Another model of the Crown, built from odd materials at a total cost of 4s. 3d. by Mr. D. Haig, Sale Moor.

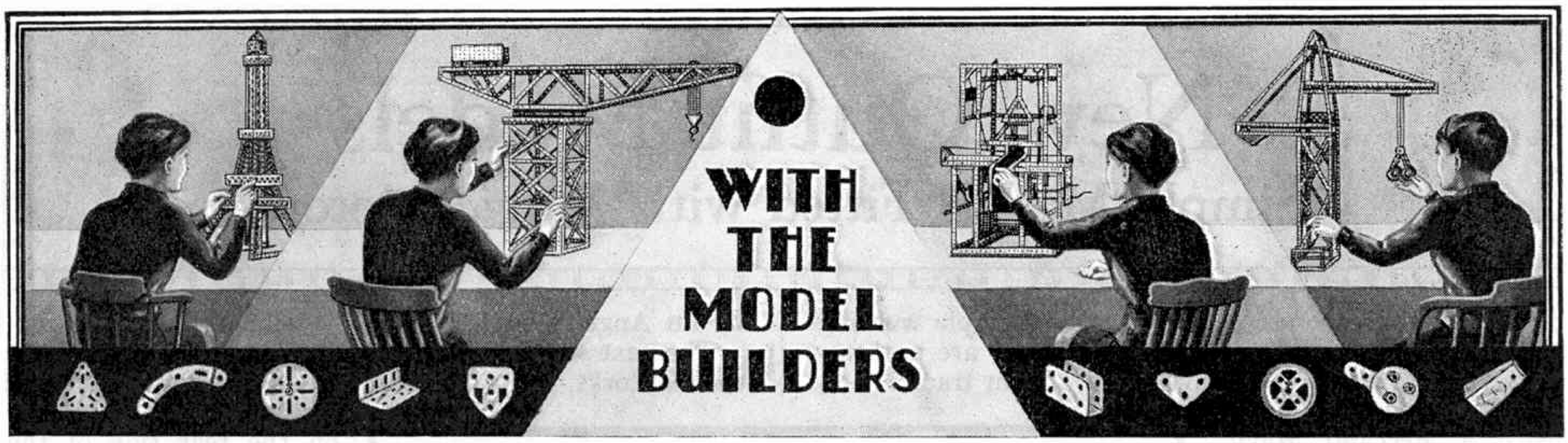
It is interesting to compare this Meccano model of St. Edward's Crown with one made by Mr. Douglas Haig of Sale Moor, near Manchester, and shown in our lower illustration. Mr. Haig is an employee of the Metropolitan-Vickers Electrical Company of Trafford Park, and completed his model as a work of fine craftsmanship for a centre piece to the Coronation decorations of his department in the Metropolitan-Vickers Works. It is contrived of strips cut from an old tin can, and is ornamented with jewellery from Woolworth's and glass buttons and beads from a kitchen oddments box, but is so rich in appearance that it looks as if it ought to be placed in the Tower of London for safe custody!

The model was assembled with the use of solder and fish-glue, and the work needed great patience. The base is a tin strip cut to length and with its ends soldered together. The top arch strips were made, shaped and attached in a similar manner, and the structure was next embellished with cut strips of "bugle" work, or beaded cloth. At this stage the whole was given a coat of Woolworth's best gold paint.

The "monde," or orb, is an old golf ball, a Dunlop No. 3. Few golf balls surely have attained such eminence! It is jewelled and held in position by two encircling strips of tin, banded with string pearls. The cross is cut out of 1/16" brass, and the "ruby" in its centre is the faceted glass of a bicycle reflector light. The fleurs-de-lys and the general ornaments are built up of broken-off bits of old jewellery from the toy cupboard and the button box. The total expenditure on materials was 4s. 3d., and there can be few crowns that have cost so little!

The Meccano reproductions of the Sceptre with the Cross and the Sceptre with the Dove were as striking as those of the Crown, and in each the rich colour of the original was splendidly represented by the gold of the parts used in making it. The Sceptre with the Cross is placed in the right hand of the Sovereign at the Coronation ceremony, and the Sceptre with the Dove in his left hand.

The scroll work of the Sceptre with the Cross was reproduced by Strips bent to shape and ornamented with $\frac{3}{4}$" and $1\frac{1}{4}$" Discs, and the cross was made in a similar manner to those on the crown. The dove on the second sceptre presented several problems to the model-builder, but these were solved ingeniously. The body was made by carefully bending $4\frac{1}{2}$" and $5\frac{1}{2}$" Strips to shape. A ball $1\frac{1}{2}$" diameter represented the head, while bolts on each side gave the appearance of eyes, and a Pawl without boss was used for the beak. Each wing consisted of six 4" Curved Strips overlapping at one end and spreading out like a fan at the other. The orb and the cross were represented in an equally skilful manner.



REVERSING MECHANISM FOR TRANSPORTER BRIDGE MODELS

Transporter bridges are popular subjects with model-builders and several interesting methods have been devised for reversing the direction of travel of the carriage when it reaches each end of the bridge. Most of these systems necessitate placing part of the mechanism in each shore tower, connection being made between the two parts by means of long rods or Sprocket Chain. With the object of eliminating this connecting gear the following method, in which the control mechanism is confined to one tower only, is suggested.

The Motor is secured in one of the towers and is connected by a length of Sprocket Chain to a horizontal 4″ Rod, on the end of which is a ¾″ Contrate Wheel. The Contrate Wheel is arranged to mesh with either of two ½″ Pinions, which are mounted on a shaft carrying a Pulley Wheel that drives the carriage, and are spaced apart so that when one is in mesh with the Contrate, the other is about ¼″ away from it. The 4″ Rod also carries at its centre a Worm Gear, that meshes with a 57-teeth Gear Wheel on a vertical 3½″ Rod. A Single Throw Eccentric is fastened to the vertical Rod and its arm is extended by a 3″ Strip, to the end hole of which a Screwed Rod is attached by two Nuts. The other end of the Rod is screwed into a Collar carrying the driving Pulley. The position of the carriage in relation to the mechanism is adjusted so that it remains stationary at the shore towers while one of the Pinions is being pulled out of mesh and the other into mesh with the ¾″ Contrate Wheel.

AN INTERESTING SHIPYARD CRANE

The crane model illustrated on this page is the work of A. Mills, Midlothian. It is modelled on the type of crane used in the fitting-out basins of shipbuilding yards for lifting funnels and boilers into position, and for stepping masts. A crane for this work requires a long jib, though it need not have great lifting power. The model is hand-driven, and it is capable of slewing, luffing and hoisting, all these movements being controlled by levers from a gear-box in the cab. The crane is mounted on the quay and ships to be fitted out with its aid are hauled alongside by means of electric capstans fitted at its base.

FIXING A PULLEY ON A SLIDING SHAFT

In certain kinds of models it is necessary to take a belt or cord drive from a Pulley on the sliding shaft of a gear-box. If the Pulley is secured directly to the shaft, it is usually found that as the shaft moves the Cord tends to slip off the Pulley. This tendency may be corrected by fastening two Bush Wheels on to the shaft so that their holes coincide. Two Rods of suitable length are then pushed through holes at opposite sides of the Bush Wheels and retained in place by means of Collars. A 1½″ diam. Pulley Wheel is slipped on to the shaft so that the Rods protruding from the Bush Wheels pass through its holes, and the setscrew in its boss is left loose. When the shaft is turned the Rods force the Pulley to revolve, but if the shaft is moved laterally the tension of the driving belt holds the 1½″ Pulley in line, and the two Rods slide through it.

MECCANO WASHERS AS TERMINAL TAGS

S. W. Telpher, Barnard Castle, has discovered that by using Meccano washers as terminal tags it is possible to connect up an Electric Motor without any danger of the bare ends of the lead wires touching the frame of the model. The bared end of each lead is twisted around the rim of a washer, which is then placed on the terminal of the Motor and fastened in position.

MAKING ENGINE CROSSHEADS

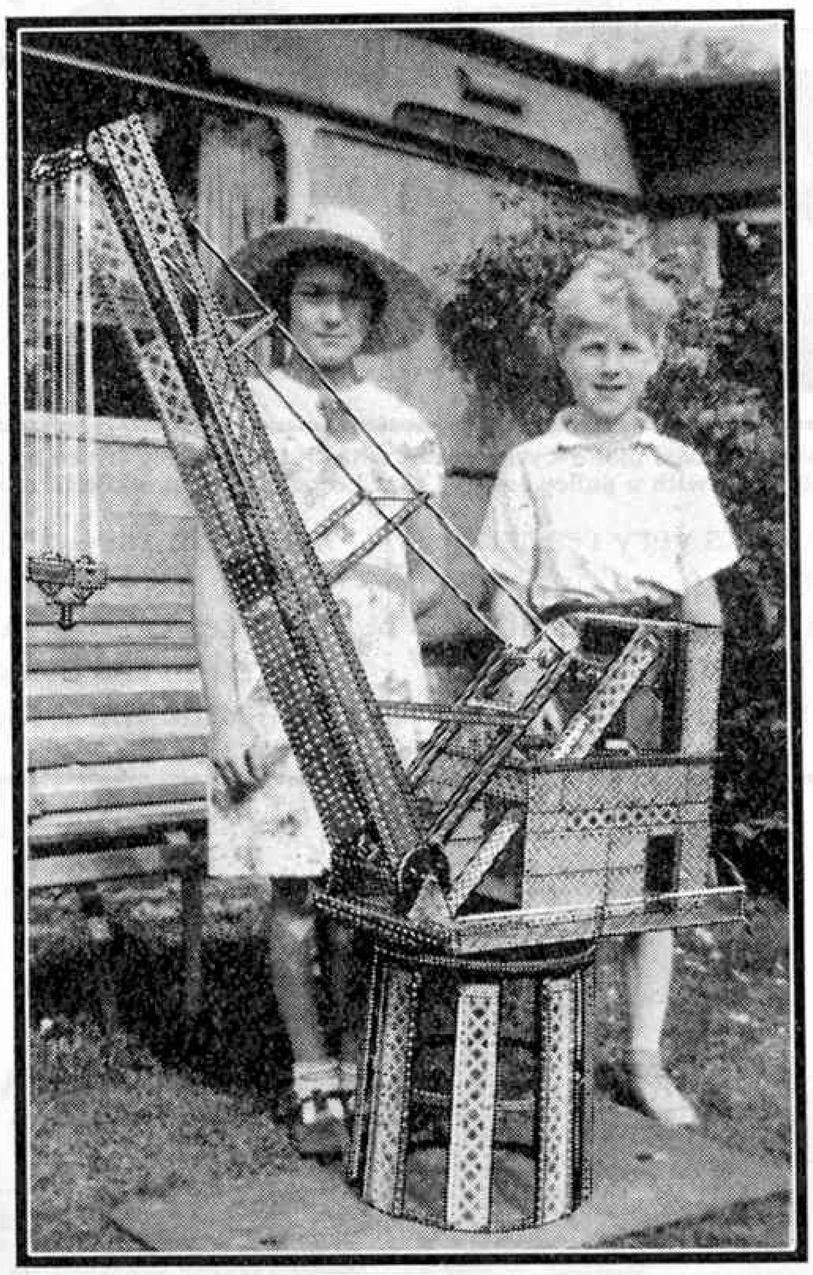
In every model of a reciprocating engine some form of crosshead, the link between the piston and the connecting rod, is required. There are many different methods of making this part of the mechanism in Meccano, each suited to some special size or type of model, and we are describing a few of the most satisfactory for the benefit of the many readers who are interested in this branch of model-making.

In simple models in which a Strip forms the connecting rod, an efficient crosshead can easily be made by pivotally attaching the end of the Strip to the centre hole of a Double Bracket. The piston rod is then passed through two opposite holes of the Double Bracket and locked in position by two Spring Clips.

A neater crosshead can be constructed by means of an End Bearing. A Strip forming the connecting rod is lock-nutted by its end hole to the narrow end of the End Bearing, and the piston rod is then secured in its boss.

If Rods are used for both the connecting rod and the piston rod, they can be pivotally connected in the form of a crosshead by using a Swivel Bearing. One Rod is locked in the Collar and the other in the boss of the small Fork Piece.

A good crosshead for use in models built with the larger Outfits can be made from two Bush Wheels. These are secured to a short Rod with their bosses facing outwards, and are spaced apart by two or three washers. The crosshead slides between two Angle Girders, which are bolted to the frame by Angle Brackets so that their near edges are an inch apart. The piston rod is secured in a Collar fastened by two Bolts to the Bush Wheels. The connecting Strip is pivotally fastened to the Bush Wheels by a ⅜″ Bolt, which is pushed through the two Bush Wheels and the end hole of the Strip.



A fine model crane of the type used in the fitting-out basins of shipbuilding yards for placing boilers, funnels and machinery in the hulls of vessels. It is the work of A. Mills, Midlothian, and his young lady assistant, who are shown with their handiwork.

A USEFUL MECCANO BALANCE

P. Agius, Neuilly-sur-Seine, France, has found Meccano useful for making a balance suitable for weighing small quantities of chemicals. The beam from which the pans are suspended consists of two 7½″ Strips joined at their ends by a Double Bracket, and supported at their centres on a safety razor blade that fits into small slots filed in the edges of the Strips. Flat Plates are used for the pans and are attached by Cord to the ends of the beam.

The baseboard and the vertical support for the beam are made from wood, but they could be built up quite easily from standard Meccano parts.

The balance can be adjusted by two Threaded Bosses, which are screwed on short Screwed Rods. Each of the Screwed Rods is secured by two Nuts to the centre hole of one of the Double Brackets at the ends of the beam. A length of wire is fastened to the centre of the beam and is adjusted so that when the two pans are evenly balanced, its free end points to the zero mark on a scale mounted at the base of the beam support.

The baseboard of the scale is fitted with two spirit levels set at right angles to each other. Each of these is constructed by filling a narrow-bore test tube with oil, and then sealing up its open end.

A FLEXIBLE DRIVING UNIT

From time to time we receive letters asking if it is possible to arrange with Meccano parts a drive more flexible than that provided by the Universal Coupling. For this purpose we recommend the Flexible Coupling Unit (Part No. 175). This consists of a 2″ length of springy material, the ends of which are solid. The diameter of the Flexible Coupling Unit is the same as that of the standard Rod, and therefore, it is possible to secure its end in a Coupling, Collar or the boss of any Meccano Wheel. The Flexible Coupling Unit provides a drive that will operate efficiently and smoothly through acute angles, and will be found useful for coupling up a Motor to a Rod that is considerably out of line with the driving shaft.

A MINIATURE AEROPLANE ENGINE

A novel working model of a four-cylinder "in-line" type aeroplane engine was built recently by A. Bentley of Birmingham. The cylinders are represented by Boilers opened out so that a 2″ Pulley can slide easily inside them, and they are fitted on their outside surfaces with cooling fins formed by circles of 2½″ small radius Curved Strips, which are supported on Rods, but spaced apart by Washers. Each cylinder head is built up from Angle Girders and Flat Girders, and valve stem casings are represented by Rods carrying Washers.

The crankshaft is built up from Rods and Couplings, and the connecting rods, which are Strips, are pivoted in End Bearings fastened to 2″ Rods, each of which carries two 2″ Pulleys forming the piston. The crankcase is built up from Strips and Flexible Plates, the ends being filled in by a 3″ Pulley and Flexible Plates. The camshaft is driven through gears from the crankshaft, and carries Collars fitted with Kemex Stand Clamps (Part No. K31), which serve as cams for raising the valve tappets. An Electric Motor housed in a dummy magneto casing is arranged to drive the model through a train of gears. The complete engine is carried on bearers built to represent the fuselage of an actual aeroplane.

DINKY TOYS AEROPLANES AS MASCOTS FOR BICYCLES

Model-builders who are also keen cyclists may be interested to learn how W. Willmott, of Blackpool, recently made a fine mascot for his bicycle from Dinky Toys and standard Meccano parts. Three of the Fairey "Battle" Bombers (Dinky Toys No. 60n) were used for the purpose, and they were arranged in V formation on a T-shaped bracket constructed from three Rods and a Coupling. The mascot was then mounted on a handlebar bracket made by bending a Strip to the required shape.

Another Dinky Toy that makes an imposing mascot is the Short "Singapore" Flying Boat (Dinky Toys No. 60h). The "Singapore" has a small hole in the centre of its lower wing, and it is quite an easy matter to lock-nut a short Screwed Rod in this hole to serve as a support. The other end of the Rod can then be lock-nutted in a hole drilled in the mudguard of the bicycle.

The propellers on the Aeroplanes should be twisted slightly so that they will revolve in the wind, and a drop of oil should be placed on the bearings.

The Cierva Autogiro (Dinky Toys No. 60f) also makes a good mascot. The blades should be given a slight twist, and they will spin in a realistic manner when the bicycle is in motion. The fuselage of the Autogiro should be drilled to fit a suitable mounting.

New Outfit Models

Simple Models Fitted with *Magic* Motors

THIS month we are describing three simple working models built with small Outfits. They are a three-wheel sports car, a motor-cycle and a farm tractor, and each of them is fitted with a Meccano *Magic* Motor. Each of the models has been tested and was found to work very satisfactorily, and they show well how the *Magic* Motor can be used to add life and interest to small models.

The first model to be dealt with is the motor-cycle, which is shown in Fig. 1. This can be built with Outfit B, and the difficulty of balancing is got over by fitting a $\frac{1}{2}''$ Pulley to the frame in such a position that the model is kept upright while in motion. This does not spoil the appearance of the model, which runs well and looks very realistic.

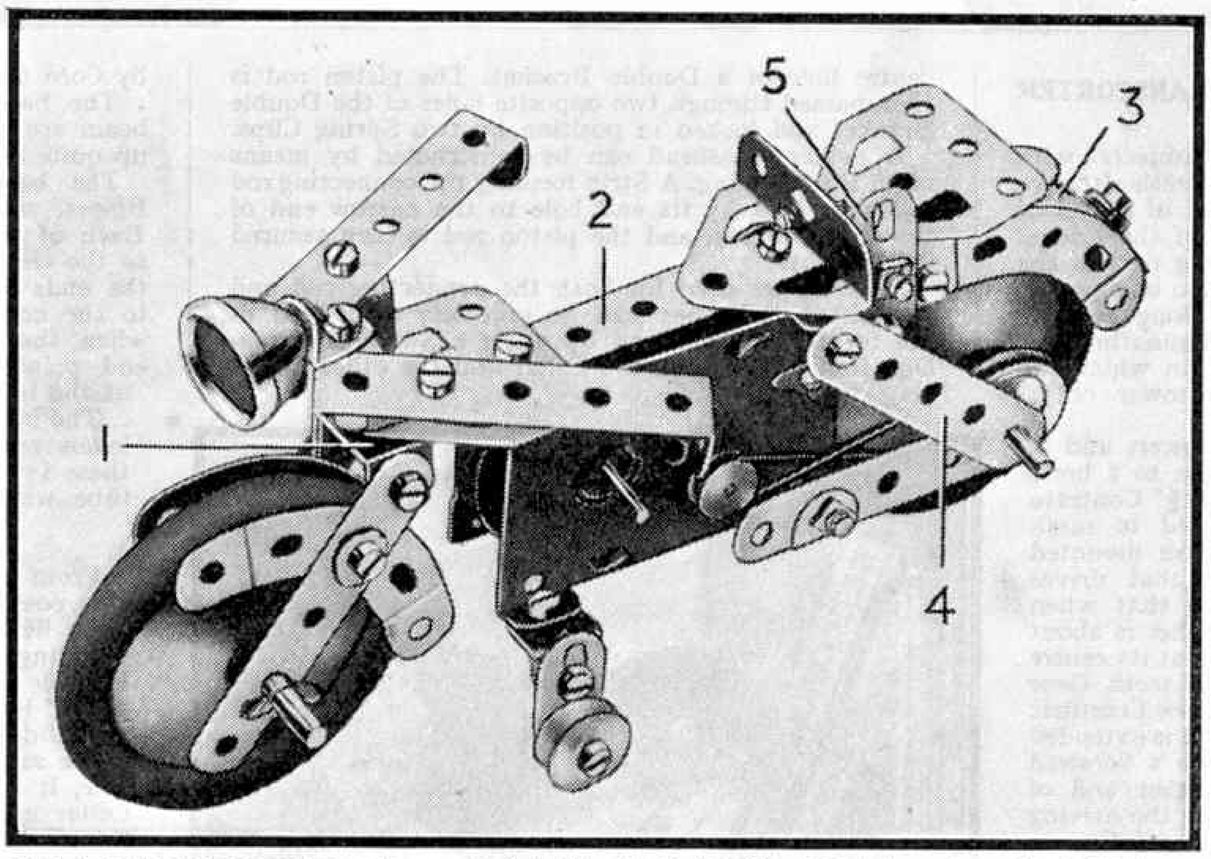


Fig. 1. This simple model motor-cycle is built with Outfit B and is driven by a Magic Motor. It is fitted with a pulley support that keeps it upright while in motion.

Construction should be commenced by making the front forks and handlebars. The Double Bracket 1 is fitted with two $2\frac{1}{2}''$ Strips, to which are bolted two $2\frac{1}{2}''$ small radius Curved Strips that represent the front wheel mudguard. The securing bolts carry Washers on their shanks for the purpose of spacing the Bolts from the rim of the Road Wheel. The handlebar is made from two Reversed Angle Brackets fastened on the shank of a $\frac{3}{8}''$ Bolt passing through their elongated holes, and two $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips. The bolt passes through a Flat Trunnion and the end hole of $5\frac{1}{2}''$ Strip 2, and is secured by lock-nuts to Double Bracket 1 so that the handlebars and forks turn together. The *Magic* Motor is bolted through its upper left-hand flange to the Flat Trunnion attached to Strip 2.

The rear mudguard consists of two $2\frac{1}{2}''$ small radius Curved Strips fixed to Angle Brackets, which in turn are bolted to $5\frac{1}{2}''$ Strip 2, the bolt passing through the third hole from its rear end. The bolt that holds the Angle Bracket carries also a $2\frac{1}{2}''$ Strip 3 extended by a Flat Bracket. The saddle is represented by a Trunnion, and a Flat Trunnion attached to it by an Angle Bracket forms the pillion seat.

The next step in the construction of the model is to fit the rear forks. These consist of $2\frac{1}{2}''$ Strips, which are bolted direct to the *Magic* Motor on the rear side of the model. On the side shown in Fig. 1, however, $2\frac{1}{2}''$ Strip 4 is held in place by a $\frac{3}{8}''$ Bolt, and the lower $2\frac{1}{2}''$ Strip is attached to one of the flanges of the Motor by an Angle Bracket. The rear Road Wheel is mounted on a 2″ Rod that carries also a 1″ Pulley spaced from the $2\frac{1}{2}''$ Strips by three Washers. It is important that the Driving Band from the Motor pulley to the 1″ Pulley on the rear wheel is twisted, as shown in the illustration; otherwise the model will travel backwards!

The $\frac{1}{2}''$ loose Pulley that keeps the model upright is carried on a $\frac{3}{8}''$ Bolt lock-nutted to a Flat Bracket attached to the Motor by an Angle Bracket. Two Flat Brackets 5 bolted together and lock-nutted to the brake-lever, allow the Motor to be controlled while the model is actually in motion.

If desired a Spotlight from a Meccano Lighting Set can be fitted to the model. It should be clamped to the handlebars by one of the Angle Brackets supplied with the Lighting Set.

Parts required to build the model motor-cycle: 1 of No. 2; 7 of No. 5; 4 of No. 10; 1 of No. 11; 5 of No. 12; 2 of No. 17; 1 of No. 22; 1 of No. 23; 2 of No. 35; 26 of No. 37; 6 of No. 37a; 6 of No. 38; 2 of No. 48a; 4 of No. 90a; 3 of No. 111c; 2 of No. 125; 1 of No. 126; 2 of No. 126a; 1 of No. 186; 2 of No. 187. (1 *Magic* Motor, 1 Lighting Set, not included in Outfit.)

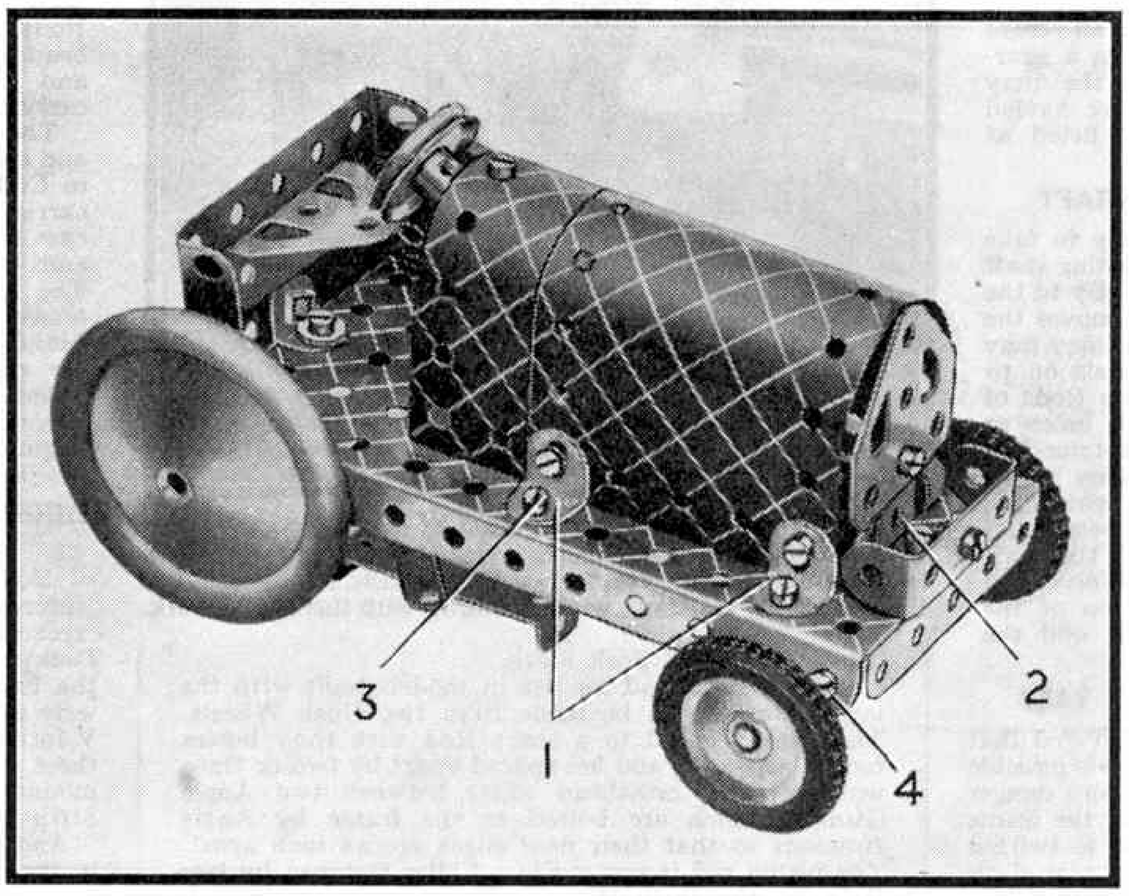


Fig. 2. A model farm tractor that forms a good subject for owners of Outfit C. The front wheels are driven by a Magic Motor.

The small but effective model of a farm tractor shown in Fig. 2 can be built with Outfit C. Construction is commenced by bolting two Angle Brackets 1 and also two corresponding Angle Brackets on the rear side of the model, to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate that forms the chassis. Two $4\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates are then curved to the required shape, and bolted to the Angle Brackets 1 on the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate, the Flexible Plates being overlapped three holes as shown.

The radiator consists of Trunnion 2 and a Flat Trunnion bolted together, and then fixed to the chassis. The

number plate at the front of the tractor is represented by a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, which is fastened to the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate by an Angle Bracket. A 1" Pulley that represents the steering wheel is held in position by means of a $\frac{3}{8}''$ Bolt, which is passed through the free hole of an Obtuse Angle Bracket bolted to the bonnet, and secured in the boss of the Pulley.

The back of the tractor is formed by a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate fastened to the chassis by an Angle Bracket, and a Trunnion representing the seat is fixed to the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate, in the position shown in Fig. 2. The *Magic* Motor is held in position underneath the tractor by the Bolt 3 and a second Bolt in a similar position on the other side of the model.

The front axle is a $3\frac{1}{2}''$ Rod, which is journalled in the holes of two Flat Brackets bolted at 4 on each side of the tractor. The $\frac{1}{2}''$ fast Pulley supplied with the Motor is fixed on the front axle, and is connected by a Driving Band with the pulley on the Motor shaft. Bearings for the back axle are formed by the end holes in the sides of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plate.

Parts required to build the model farm tractor: 2 of No. 10; 6 of No. 12; 1 of No. 12c; 2 of No. 16; 3 of No. 22; 19 of No. 37; 4 of No. 38; 1 of No. 48; 1 of No. 51; 1 of No. 52; 1 of No. 57c; 1 of No. 111c; 1 of No. 126; 2 of No. 126a; 1 of No. 186; 2 of No. 187; 2 of No. 191. (2 1" Tyres; 1 *Magic* Motor, not included in Outfit.)

The small three-wheeled sports car, of which two views are reproduced on this page, is fitted with steering mechanism based on the Ackermann principle, and is built with Outfit C. The chassis construction is seen in Fig. 4, which shows an underneath view of the model. In building it two $5\frac{1}{2}''$ Strips 1 (Fig. 4) are fitted with Reversed Angle Brackets bolted in the fourth holes from the ends of the Strips, and at their other ends the Strips carry Angle Brackets, which are bolted to Double Angle Strip 2. Further $5\frac{1}{2}''$ Strips 3 are fastened by their end holes to the Reversed Angle Brackets, and Double Angle Strips 2 is arranged so that its ends fit on the outside of Strips 3. The *Magic* Motor is now bolted in position. The 2" Rod carrying the rear Road Wheel and 1" Pulley is journalled in the second holes of Strips 1, and is held in place by Spring Clips. The Road Wheel is spaced from the $5\frac{1}{2}''$ Strip by three Washers.

The tail of the car comprises two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates bolted end to end, curved, and overlapped as shown in the illustration on this page. A $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate is bolted to the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates by means of an Obtuse Angle Bracket, and two $1\frac{11}{16}''$ radius Curved Plates are bolted together, the bolt 4 holding also the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate. Each of the $1\frac{11}{16}''$ radius Curved Plates is then bolted at 5 to the $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates forming the sides. A $2\frac{1}{2}''$ small radius Curved Strip fastened to an Angle Bracket, forms the back of the driving seat and completes the tail of the car.

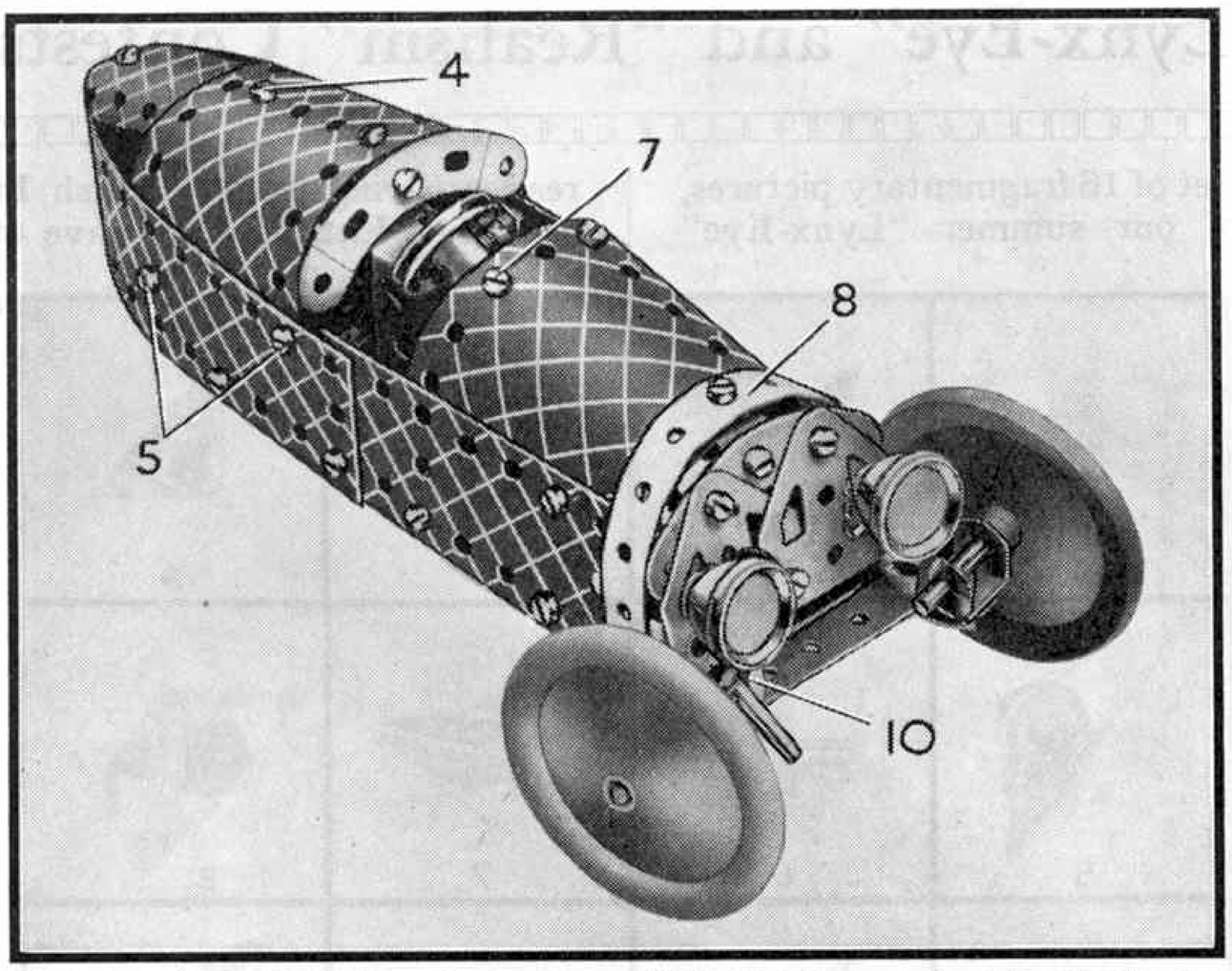


Fig. 3. A sturdy model of a three-wheel sports car, fitted with Ackermann steering mechanism and electric headlights from a Meccano Lighting Set. It can be built with Outfit C.

The side shown in Fig. 3 is extended to the front of the chassis by two overlapping $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates overlapped and bolted as shown, the bolt holding the front Flexible Plate carrying also $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 6. A $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate is bolted to the other side so that a gap is left to enable the winding key of the *Magic* Motor to be fitted on the winding shaft.

The bonnet is next fitted. This consists of two U-Section Curved Plates overlapping three holes, Bolt 7 holding also an Angle Bracket. The Curved Plates are then fastened to the $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates forming the sides, one of the Bolts holding also a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip (see Fig. 4). The steering column is a Crank Handle, and is passed through the centre hole of the $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip and through the Angle Bracket held by Bolt 7, being retained in place by Spring Clips and the 1" Pulley representing the steering wheel.

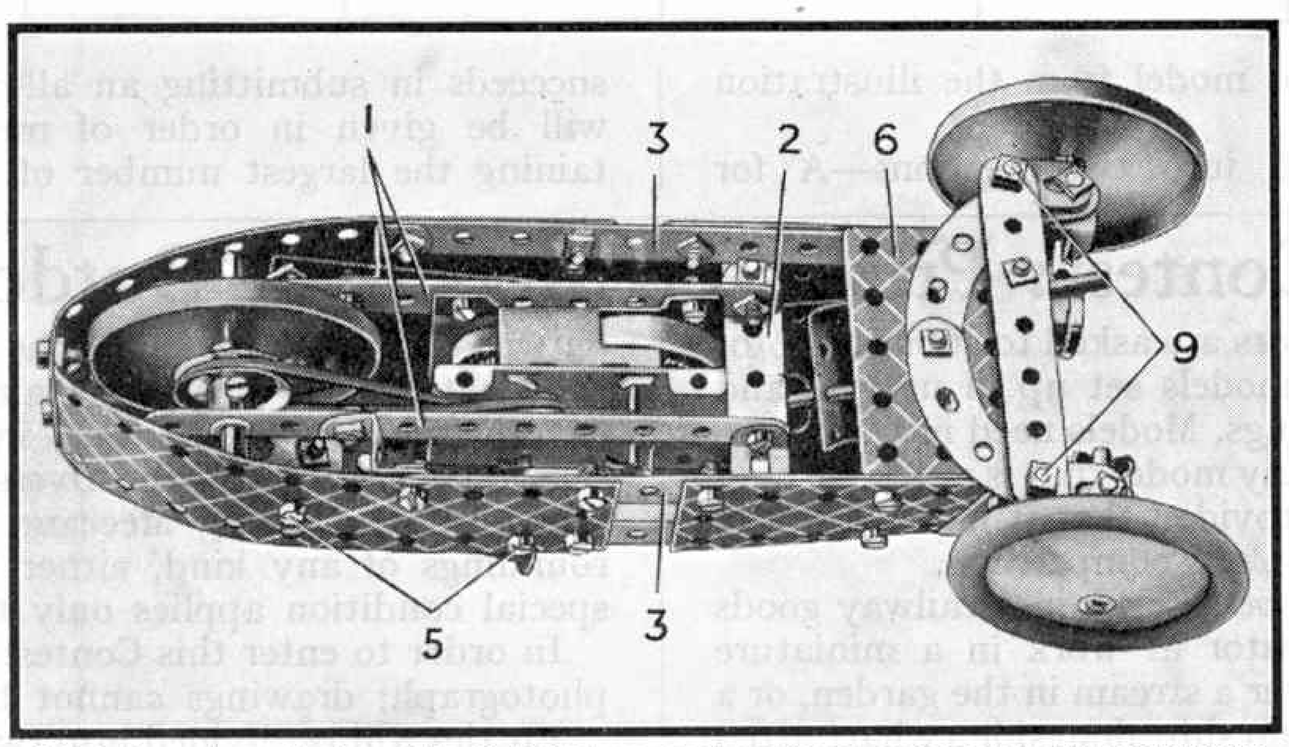


Fig. 4. An underneath view of the Outfit C three-wheel sports car, showing how the Magic Motor is mounted in the chassis.

The radiator consists of two Flat Trunnions bolted to a $2\frac{1}{2}''$ small radius Curved Strip and also to a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip at the bottom. A $5\frac{1}{2}''$ Strip 8 is curved to shape and bolted to $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flanged Plate 6 and also to the top of the bonnet, the Bolt by which Strip 8 is held carrying also an Obtuse Angle Bracket. Finally the radiator is bolted to the Obtuse Angle Bracket and the $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip is wedged in place.

Two $\frac{3}{8}''$ Bolts have Double Brackets locked on their shanks and pass through the end holes of the $2\frac{1}{2}''$ small radius Curved Strips. A Washer and a Nut are added, and the Flat Brackets are then securely lock-nutted in place to the $3\frac{1}{2}''$ Strip. The Bolts 9 are lock-nutted, and Angle Bracket 10 engages with the end of the Crank Handle.

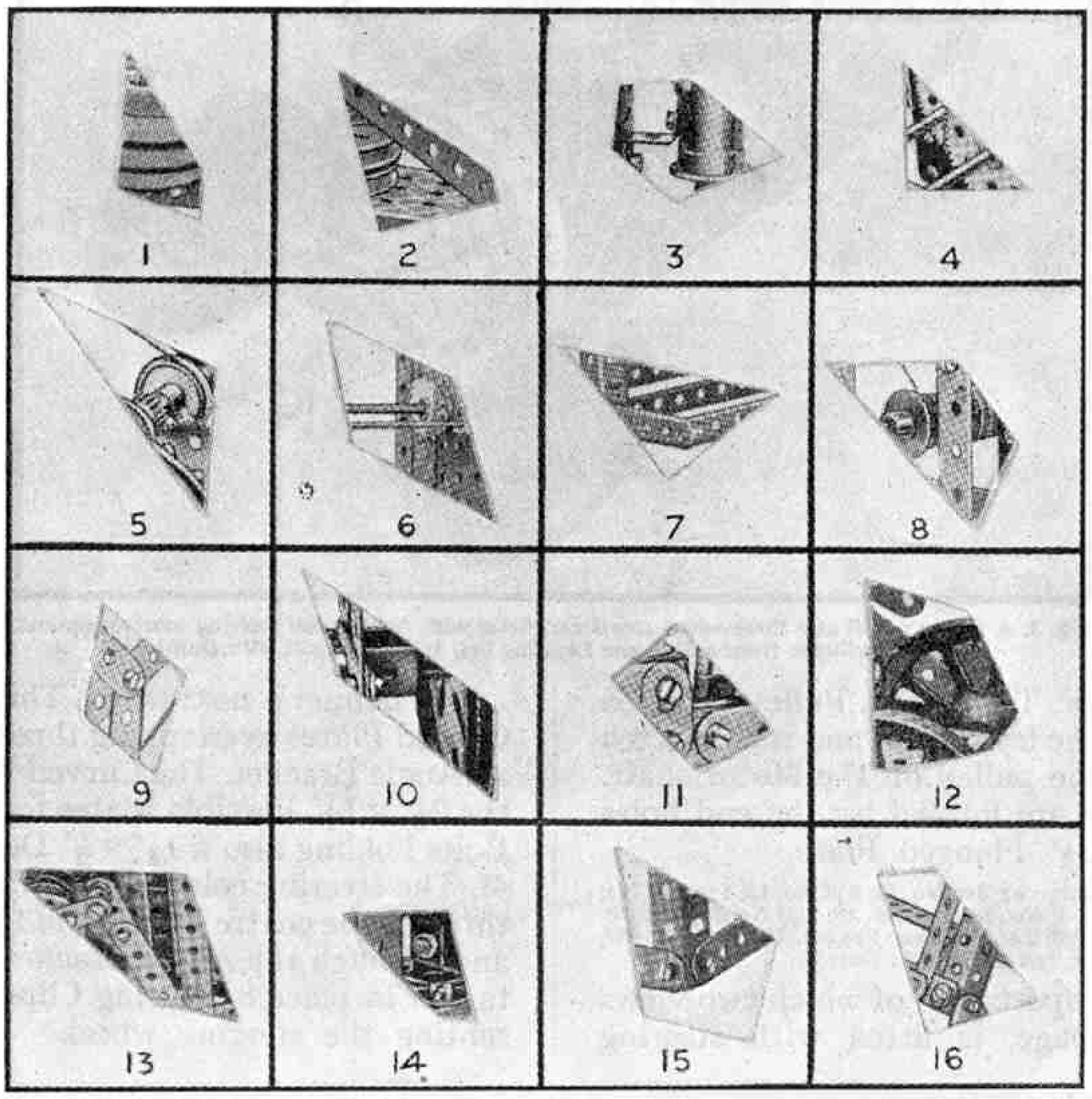
Parts required to build the model three-wheeled sports car: 5 of No. 2; 1 of No. 3; 1 of No. 5; 2 of No. 10; 2 of No. 11; 5 of No. 12; 2 of No. 12c; 1 of No. 17; 2 of No. 18a; 1 of No. 19s; 2 of No. 22; 6 of No. 35; 42 of No. 37; 8 of No. 37a; 8 of No. 38; 1 of No. 48; 2 of No. 48a; 1 of No. 51; 4 of No. 90a; 2 of No. 111c; 2 of No. 125; 2 of No. 126a; 1 of No. 186; 3 of No. 187; 4 of No. 188; 2 of No. 189; 2 of No. 199; 2 of No. 200. (1 *Magic* Motor, 1 Lighting Set, not included in Outfit.)

Special Summer Meccano Competitions

"Lynx-Eye" and "Realism" Contests

On this page is a further set of 16 fragmentary pictures, comprising the second of our summer "Lynx-Eye" Competitions. For the benefit of readers who have not seen the announcement of the first competition, which appeared in the June issue of the *"M.M.,"* we are again including full details, together with one or two hints that will be found useful in solving these novel puzzles.

Each of the 16 pictures illustrated is a fragment taken from an illustration of a model shown in the Meccano O–E and F–L Instruction Manuals. All a competitor has to do is to find out from which Manual illustration each fragment has been taken. Entries should be on postcards, and for each picture the competitor should give first the number attached to it on this page, and then the number of the Manual model from the illustration of which it is taken.



The Contest is divided into two Sections—A for readers living in the British Isles; B for readers living Overseas. Entries must have on them the competitor's name and full address and must be addressed "Second Lynx-Eye Contest," Meccano Ltd., Binns Road, Liverpool 13. Those for Section A must reach Liverpool not later than 31st August, 1937. The Overseas Section will remain open for entries until 30th September, 1937.

The following prizes will be awarded in each Section to the competitors who succeed in solving the greatest number of the puzzle pictures: First, Meccano products value £2/2/–; Second, Meccano products value £1/1/–; Third, Meccano products value 10/6.

If more than one competitor solves all the puzzles, the prizes will be awarded to the first correct entries examined. If no competitor succeeds in submitting an all-correct result, the prizes will be given in order of merit to the entries containing the largest number of correct solutions.

"Realism" Contest: Prizes for Models in Outdoor Settings

In this Contest competitors are asked to submit photographs showing Meccano models set up in natural and realistic outdoor surroundings. Models need not be specially built for this Contest; any model that is available may be used for the purpose provided that it has not won a prize in any previous *"M.M."* competition.

Suitable subjects would be a scene in a railway goods yard, a mechanical excavator at work in a miniature quarry, a bridge erected over a stream in the garden, or a dock view showing a Meccano ship alongside a wharf fitted with cranes for discharging the cargo. These suggestions will give competitors some idea of the lines on which they should work, and there should be no difficulty in finding other equally interesting and suitable subjects. Any kind of model may be used, but one that can easily be incorporated in a suitable setting should be chosen.

The main object of the competitors should be to make their settings as lifelike as possible, and this will be easier with a simple design than with an elaborate arrangement crammed with unnecessary detail. The model itself may be quite a simple one, good proportions and a realistic outward appearance being the main features required.

Climatic conditions in certain Overseas countries are exactly the opposite of those in Great Britain. For this reason competitors in the Overseas Section are asked to send entries showing Meccano models in realistic surroundings of any kind, either indoor or outdoor. This special condition applies only to Overseas competitors.

In order to enter this Contest it is necessary to send a photograph; drawings cannot be accepted.

Entries will be divided into two Sections: A, for readers living in the British Isles; B, for readers living Overseas. Prizes consisting of Meccano products, to the value of £2/2/–, £1/1/–, and 10/6 respectively, will be awarded to the senders of the three entries in each Section that the judges consider to be the most realistic, and consolation prizes also will be awarded in each Section.

Entries must bear the competitor's age, name and address and should be posted to "Summer Realism Contest," Meccano Ltd., Binns Road, Liverpool 13. The closing dates are: Section A, 31st August, 1937; Section B, 30th October, 1937.

Model-Building Competition Results

By "Spanner"

"New Year" Contest (Home Section)

The "New Year" Contest is organised at the height of the model-building season and always attracts a large number of entries, many of which are submitted by newcomers to the Meccano hobby. Excellent models usually are sent in both by enthusiasts of long standing and by keen beginners, and as usual this season's "New Year" Competition produced some remarkably fine work. It was a difficult matter to decide which models were the most deserving, and only after long and careful consideration was it decided to award the prizes as follows:

1st Prize, Meccano or Hornby products value £3/3/–: J. Harley-Mason, Sutton Valence, Kent. 2nd, products value £2/2/–: L. Willington, Birmingham 6. 3rd, products value £1/1/–: J. Westhead, Brinnington, Stockport.

Products value 10/6: J. Stutley, Sevenoaks; E. Turner, Chatham; D. Cashmore, Ruislip; J. Kent, Gloucester; W. Bowley, Alvaston, Derby; E. Clements, Farnborough.

Products value 5/–: A. Barkley, Chadwell Heath; D. Wright, Liverpool; J. Matthews, Fillongley, Nr. Coventry; S. Critchley, Luton; D. Hyslop, Barrow-in-Furness; A. Dannatt, Lough.

First Prize was awarded to J. Harley-Mason for a fine model of a travelling gantry crane, which is fitted with two pulley blocks arranged for independent control. Although only one motor is used in the model, all the motions of a real crane of this type can be carried out. The entire model, which is 5 ft. long and 4 ft. wide, travels on 24 Flanged Wheels, arranged in four bogies of six wheels each and spaced apart to conform with the gauge of Hornby rails, and controls for all movements are centralised in the cabin mounted on the gantry.

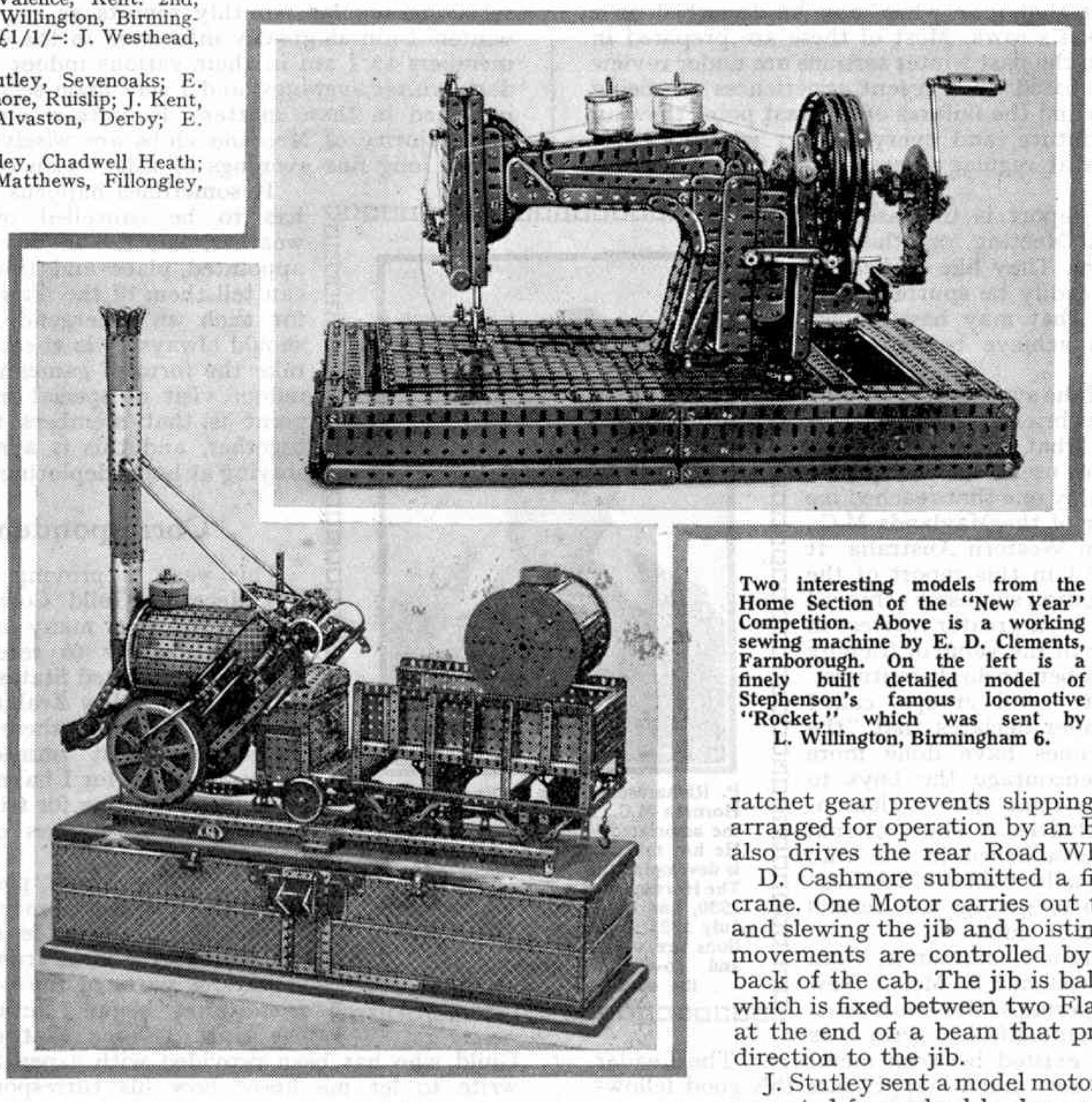
The fine model of Stephenson's "*Rocket*" locomotive, illustrated on this page, was sent by L. Willington and was awarded Second Prize. The model is remarkable for the amount of detail to be seen in the cab, and a particularly neat arrangement of the cylinders and pistons.

The boiler consists of 5½" Strips bolted at each end to 5½" diameter Circular Girders, and the firebox is constructed from Flat Girders and Perforated Plates. Each of the pistons is made by bolting together two 1 11/16" radius Curved Plates, and slides in a cylinder that is formed by a 5½" × 1½" Flexible Plate. The front wheels are made by bolting 5½" diameter Circular Girders to 6½" diameter Circular Plates. This gives a satisfactory flange.

The tender is built on a chassis of Angle Girders and carries a water tank made from Flexible Plates fastened between two 6½" Circular Plates.

One of the most impressive models entered in the competition is a fine grandfather clock, by J. Westhead. The clock is fitted with Westminster chimes and strikes the quarter hours. The chiming mechanism is controlled by a No. 1 Clockwork Motor, and the striking gear by a No. 2 Motor. The time-keeping mechanism is actuated by a heavy weight, and the going train carries an electric impulse transmitter for operating one or more slave clocks.

A fine working model of a sewing machine was the entry of E. D. Clements. The model earned its prize chiefly on account of its originality. It is a pleasant change to find models of such an uncommon type amongst the innumerable cranes, motor cars and ships that are featured in the majority of the entries in the "*M.M.*" Contests. It is evident that a great amount of care was taken in building the model, and the illustration on this page shows the large amount of detail that is included in it. The top of the base is hinged so that the mechanism that operates the shuttle can be examined.



Two interesting models from the Home Section of the "New Year" Competition. Above is a working sewing machine by E. D. Clements, Farnborough. On the left is a finely built detailed model of Stephenson's famous locomotive "Rocket," which was sent by L. Willington, Birmingham 6.

The entry sent by W. Bowley is a modern racing car, the construction of which is carried out in a neat manner with Strips of various sizes, the complete model presenting a very pleasing appearance. Its neatness is not the only feature of the car, however, for it is fitted with Ackermann steering, internal expanding brakes and independent front wheel suspension.

One of the smaller prizes was awarded for a solidly-built model fire-engine sent by J. L. Kent. The model is fitted with an extending ladder 3 ft. in length, and two water pumps. Elevation and lowering of the ladder are controlled from a Crank Handle, and ratchet gear prevents slipping. The water pumps are arranged for operation by an E6 Electric Motor, which also drives the rear Road Wheels of the fire engine.

D. Cashmore submitted a fine model of a dockside crane. One Motor carries out the operations of luffing and slewing the jib and hoisting the load, and all these movements are controlled by levers mounted in the back of the cab. The jib is balanced by a lead weight, which is fixed between two Flat Plates and is mounted at the end of a beam that protrudes in the opposite direction to the jib.

J. Stutley sent a model motor chassis fitted with compensated four-wheel brakes and Hobb's inertia gear.

Christmas "Simplicity" Contest (Overseas Section)

1st Prize, Meccano or Hornby products value £2/2/–: divided equally between Nyi Kyih Vung, Shanghai, China, and D. Hutt, Waikato, New Zealand. 2nd Prize, products value £1/1/–: divided equally between C. Cali Corleo, St. Julians, Malta, and J. Oleaga, Buenos Aires. 3rd Prize, products value 10/6: divided equally between G. Phillips, Brandon, Manitoba, Canada, and J. Addison, Natal, South Africa.

Products value 5/–: H. Stuart, Ohakune, New Zealand; R. Quick, Te Amamutu, New Zealand; D. White, Frazer Town, Bangalore, India.

"Suggestions Voting" Contest

1st Prize, products value £2/2/–: T. Green, Mapperley, Notts. 2nd, products value £1/1/–: C. Keekok, Singapore, Straits Settlements. 3rd, products value 10/6: divided equally between J. Brereton, Saffron Walden, and J. Reid, Pietermaritzburg, Natal, South Africa.

The six "Suggestions" chosen by the votes of competitors as the best described in the "*M.M.*" during 1936 are as follows: 1. (345) Distance Control for Electrical Apparatus (F. Jenkins, Birmingham); 2. (352) Electrically-operated Radial Engine (M. Andrews, Salford); 3. (361) Four-Cylinder Solenoid Engine (A. Lockhowe, Edinburgh); 4. (347) Bendix Pinion for Self-Starter (E. Jones, Cardiff); 5. (367) Automatic Overload Release (K. Anderson, Birkenhead); 6. (348) Automatic Reversing Gear (L. Keith ,Edinburgh).



The Club Spirit at its Best

Many Leaders supplement the monthly reports sent in by secretaries by summaries that give what may be described as a bird's eye view of the year's work. Most of these are prepared in the summer session, when the past winter sessions are under review and plans for the future based upon recent experiences are being made. Both the successes and the failures of the past point the way to better times in the future, and every Leader who does not already sum up progress at regular intervals will find it a great help to adopt this plan.

The value of such a report is increased by reading it at the Annual Meeting, or otherwise submitting it to members. They like to hear of past successes and can readily be spurred on to remedy any deficiencies that may have shown themselves and thus to achieve better things in the coming year.

One great advantage of the system of compiling an annual report, however brief, is that it enables me to realise at a glance what progress has been made during the year. How useful such a report is in this respect was shown by one that reached me recently from the Leader of the Maylands M.C., the only Meccano club in Western Australia. It was very pleasant to read in this report of the model-building and Exhibition successes achieved by the club, but I found even greater interest in the clear evidence it gave of the value of friendly rivalry in stimulating members to do their utmost. The club is divided into rival groups, called "Factions," and the Leader declares that "the special Faction programmes have done more than anything else to encourage the boys to work together, and at the same time to demonstrate their organising abilities." The sectional system is already well established in the club movement, but other equally valuable methods may develop from reports giving the results of innovations made in other clubs.

In another of these annual summaries, from the Leader of the Christchurch M.C., New Zealand, I read that "perhaps the most outstanding feature of our club life last year was the good friendship that existed between members." The Leader adds "I need hardly say how much I appreciate this good fellowship, as it is the club's spirit at its very best." This also is very gratifying. One of the chief aims of the Meccano Guild is to develop this spirit, and Leaders can best determine whether it exists in their clubs by carefully thinking over the events of the past months in order to prepare a report such as I have suggested, and can then base future programmes on schemes for developing this spirit as well as plans for providing interesting and attractive meetings.

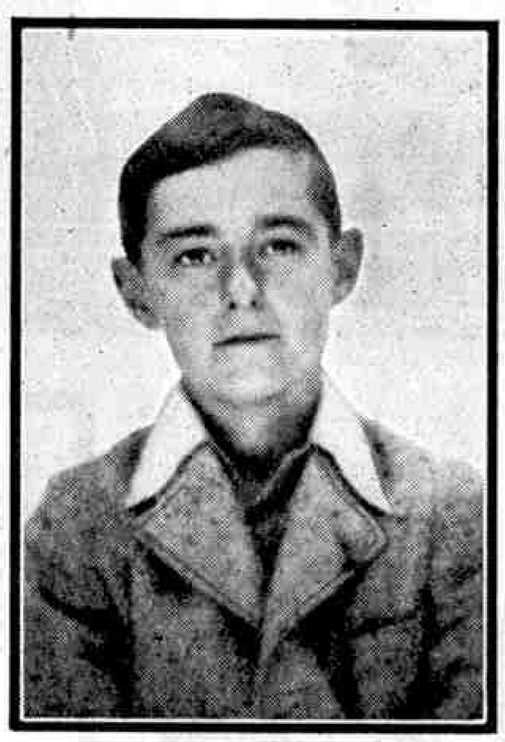
Making the Most of Visits

I am pleased to see from recent club reports that many visits to places of interest are being made this summer. This is the best time of the year for visits, and good use should be made of every opportunity. Engineering works, locomotive sheds, and factories of all kinds, are of course of especial interest to Meccano enthusiasts, and during tours of such places members should keep a keen lookout for suggestions for model-building. Their observations will enable the members to get much more than mere enjoyment out of the visits, and to lay up a very useful store of ideas for the model-building meetings next winter.

Reports on Summer Meetings

I should like to remind club secretaries that I look forward to receiving regular monthly reports as eagerly during summer as winter. I am as greatly interested in the outdoor activities of the members as I am in their various indoor occupations during the dark winter evenings, and I rely upon secretaries to keep me well informed in these matters. Reports received recently show that the majority of Meccano clubs are wisely taking full advantage of the long fine evenings of this season of the year.

It sometimes happens that an outdoor event has to be cancelled owing to unfavourable weather, but the members should meet at the appointed place and time, so that the Leader can tell them of the alternative he has arranged for such an emergency. Such an alternative should always be in the Leader's mind, and may take the form of games in the club room or an indoor visit of special interest. The important point is that members then enjoy themselves together, and this is a much better plan than staying at home deploring the inclement weather.



P. Richardson is the Engineer of the Hornsea M.C., and also is secretary of the associated H.R.C. Branch No. 190. He has taken charge of meetings and is developing into an excellent lecturer. The Hornsea M.C. was affiliated in April 1930, and the Branch incorporated in July 1931. Members of both organisations are very keen and enthusiastic, and co-operate wholeheartedly on the occasions of Exhibitions.

Correspondents Wanted

This year is proving a very busy one for the Meccano Guild Correspondence Club, but there is room for many more members. I should like particularly to receive applications from Canada, the United States, South Africa, France, Australia and New Zealand. I can promise that all applicants from these countries will be put in touch almost immediately with suitable correspondents, for I have a long list of members in England waiting for friends in those countries with whom to discuss common interests and hobbies.

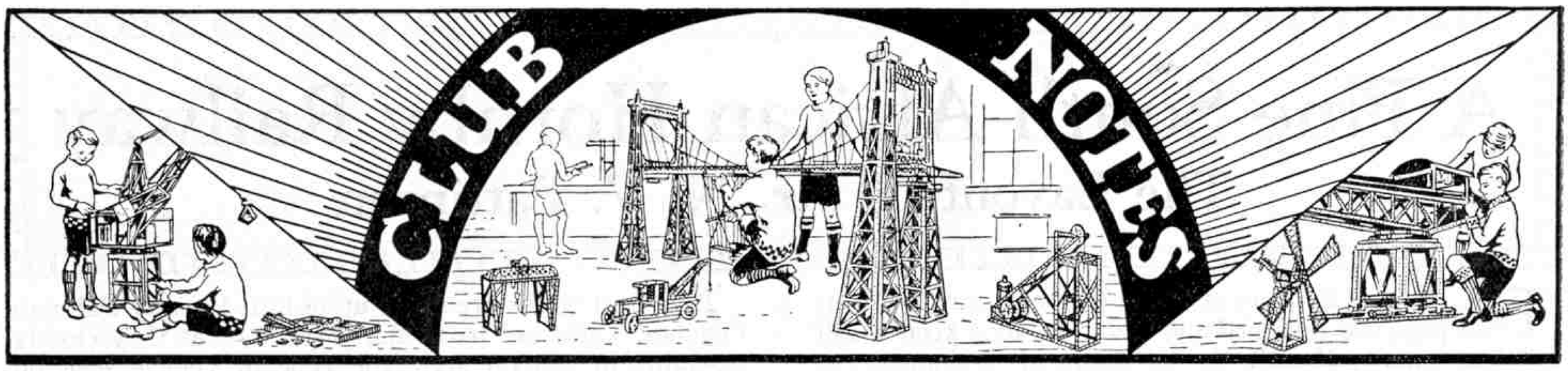
It is always very pleasant to realise how much the Correspondence Club is doing towards encouraging world-wide exchanges, and I frequently receive news from members of the club in various parts of the world of long-continued friendships begun through the medium of the club. I hope that every member of the Guild who has been provided with a pen friend in this way will write to let me know how his correspondence is progressing.

I should like to remind members of the Hornby Railway Company that a similar club has been established for their benefit. In the case of this organisation also there is a long list of members in England waiting for pen-friends overseas, and there is particularly a demand for correspondents in Canada, Australia, New Zealand, and France. Full particulars of this club may be obtained from the secretary.

Proposed Clubs

Attempts are being made to establish Meccano Clubs in the following places, and boys interested should communicate with the promoters whose names and addresses are given below:

AUSTRALIA—W. Couston, "Dunrovin," Yeelanna, Eyre's Peninsula, South Australia.
CANADA—J. Charbonneau, R.R. No. 1, Longueuil, P.Q.
DOWLAIS—M. Morris, 32, Muriel Terrace, Dowlais, Glam.
NORWAY—K. Lassen, Bygdo Albe 541I, Oslo.
WHITCHURCH—D. Slater, "Gynnor," Higher Heath, Whitchurch, Salop.
YEADON—A. Rigg, 16, Ivegate, Yeadon, Nr. Leeds.



Wednesbury M.C.—A fine display of Meccano and Fretwork models was staged by the club at an Exhibition held in connection with the South Staffs. and East Worcestershire Group of Adult Classes. Models completed by the Meccano Section have included a vertical lift bridge and a windmill, a Meccanograph and a model of the St. Malo Transporter Bridge. A Talk on "*Cameras and Photography*," by Councillor H. W. Bonner, of Walsall, was much enjoyed. A Debate on the motion "*That Town Life is Better Than Country Life*" ended in favour of the former, but only by a majority of one vote. Film shows continue to be very popular. A Lantern Lecture on "*The Beginnings of the Science of Astronomy*" proved very interesting. A party of Senior members recently visited the Headquarters of the South Birmingham Model Railway Club, and had a very enjoyable time. Club roll: 30. *Secretary:* A. L. Morgan, 17, Cobden Street, Fallings Heath, Wednesbury.

St. James' (Grimsby) M.C.—The club stock of Meccano has been increased. Excellent models of a clockwork-driven tractor and trailer have been completed, and an electrically-driven six-wheeled trolley bus is under construction. This and other large models built have been designed by members, who derive great fun from planning each part. Sliding doors and other realistic features are being incorporated in the model trolley bus, which is to be displayed in St. James' School. It is hoped to obtain the use of a larger room for club meetings, in the new school premises. Club roll: 6. *Secretary:* A. N. Dixon, 65, Yarborough Road, Grimsby.

Burnley Grammar School M.C.—The Hobbies Exhibition was a great success. The Meccano Section was particularly well patronised, its chief attraction being a model factory, with steel framework, in course of construction with the help of large cranes driven by electric motors and steam engines. The factory was modelled on one being built near the School. Club roll: 21. *Secretary:* J. S. Keighley, Grammar School, Burnley.

Folkestone M.C.—The model of Folkestone Harbour completed some time ago is proving very useful, and interesting shunting work is carried out on the quayside. A model warship named H.M.S. "*Folkestone*" has been built and berthed in the harbour. The construction of two other vessels is being planned. Many meetings have been devoted to model railway operations, and new equipment made includes additional signals and small sacks for the conveyance of sand in open wagons. Club roll: 7. *Secretary:* W. F. Cotter, 72, Dover Street, Folkestone, Kent.

York M.C.—This recently-affiliated club is divided into three groups, devoted to Meccano, Hornby Trains, and model aircraft respectively. The Meccano Section have recently completed excellent models of a traction engine, ship coaler, and robot, and are now busy building the Meccano loom. An electrified layout has been planned for the Hornby Section, and it is hoped to include automatic signalling. The Aircraft Section are constructing models of the "Flying Flea" and the Percival "Vega Gull." Club roll: 9. *Secretary:* G. A. Hodgson, 1, Sunny Side, Heslington Lane, Fulford, York.

The Beeches (Jersey) M.C.—The Exhibition was held in the School Assembly Hall, and was a great success. The club have purchased a lantern and a radio set from the proceeds. An enjoyable Lantern Lecture illustrating the Pyrenese has been given. A club magazine has been started, and a local artist friend of the club has designed an attractive cover for it. Club roll: 21. *Secretary:* J. A. Gardner, De La Salle College, The Beeches, Jersey, C.I.

Winchmore Hill Collegiate M.C.—Very realistic Meccano models have been constructed, one of special interest being a replica of the pneumatic drill apparatus used for road repair work. Good progress has been made with the model railway layout, and railway competitions and operations have been carried out with great keenness. A Model-building Section has been formed, and some fine model aircraft have already been completed. It is hoped to be able to hold Flying Contests on the school playing fields. Club roll: 32. *Secretary:* J. A. Piejus, 22, Woodland Way, Winchmore Hill, London, 21.

Great Baddow M.C.—A very interesting lecture on "*The Motor Differential*" was given by the Leader, who brought several parts to the meeting and gave demonstrations with them. Model-building classes are encouraging the members to build bigger and better models. A Games Evening, during which points were awarded to the teams, provided a pleasant variation in the club programme. Club roll: 37. *Secretary:* K. J. Avis, 5, Crescent Road, Great Baddow.

Sid Vale M.C.—A recent Model-building Meeting was devoted to a Lightship Contest. The novel subject appealed to everybody, and many excellent models were made. During a Hornby Meeting a very fine track was laid down, and the President, Mr. J. R. Foyle, set the members a series of shunting problems. A Rail Transport Contest produced a good variety of model locomotives and many different types of trucks. Table Tennis has been continued, and Lectures on "*Stamp Collecting*" have been given. Club roll: 25. *Secretary:* S. R. I. Gliddon, Sheffield House, Sidmouth.

Hornsea M.C.—Lectures, Film Shows and Games have been the chief features of the programme. At one meeting "*The Story of the St m Engine*" was read to the Apprentices, and was illustrated by pictures and lantern slides. The subjects discussed at Junior Engineer Meetings have included "*Clocks*," "*19th Century British History*" and "*Across Alaska*"; and Lectures to the Senior Scientists have dealt with "*Astronomy*," "*How to Develop Photographs*," and "*Nature*." Club roll: 17. *Secretary:* P. Thom, 5, Alexandra Road, Hornsea.



A cheery group of members of Christchurch M.C. Mr. J. Ancall, Leader, is in the middle of the back row, and on his left is L. W. Best, the secretary. This enthusiastic and enterprising club was affiliated in May 1930, and is growing rapidly. Able leadership and a skilfully varied programme are the chief factors of the club's success.

Regent Street Central School M.C.—The chief features of the recent programme have been two Lectures of special interest. One dealt with "*British Railways*." It was given by Mr. H. Chaplin, Leader, and included a very fine series of slides. The second described "*The Palatial Homes of England*." Club roll: 150. *Secretary:* R. Lunn, 14, Pickup Street, Heywood.

Stretford Public Libraries M.C.—Meetings have been devoted to Model-building. On one occasion the subject was "*Transport Vehicles*," and the 19 models completed ranged from a six-wheeled lorry and trailer to a motor cycle and sidecar. There was a special section for horse-drawn vehicles, and some ingenious models were completed in this class. Other models made have included Stephenson's "Rocket" locomotive, Hoover vacuum cleaner, windmill worked by an electric battery, and flying boats. Club roll: 33. *Secretary:* Miss F. Scattergood, Public Library, Technical Institute, Stretford Road, Old Trafford, Manchester 16.

Bridport Grammar School M.C.—This club had a very successful Spring session, during which much model-building was carried out. The Wood and Metal Work Sections are proving very popular, and the newly-formed tool club is a great success. Club roll: 30. *Secretary:* M. F. Tighe, 39, St. Anrew's Road, Bridport, Dorset.

Dagenham M.C.—Members have been chiefly occupied with model-building, and some excellent work has been accomplished. The models completed have included a long-distance bombing aeroplane, a traction engine capable of hauling its owner, and a hammer-head crane complete in all details. Club roll: 6. *Secretary:* J. Robinson, 17, Freshwater Road, Dagenham.

AUSTRALIA

Maylands M.C.—Visits have been paid to the Midland Junction Railway Workshops, and to the Cumming Smith factory, where the party were shown the manufacture of sulphuric and nitric acids, and fertilisers. A specially interesting feature at this factory was a perometer, a device for keeping the sulphur burners at an even temperature, and it was observed that several Meccano parts were incorporated in the apparatus. The club's second birthday was celebrated with a party, during which the Visitors' Month Cup was presented to the Green and Gold Faction, one of the two groups into which the club is divided. A Parents' Meeting has been held to discuss plans for increasing the club accommodation. Club roll: 29. *Secretary:* M. Thomson, 13, Kennedy Street, Maylands, W.A.

Melbourne M.C.—At one meeting a competition was held with an "Electric Questioner." A photograph of the Victorian Railway "Pacific" engine S.300 was used as the subject, and each member had to name two particular parts correctly. A Speed Contest in which those taking part had to load a block of wood into a railway truck by means of an electric gantry crane called for skilful operation. The time taken varied from one to five minutes. The Leader recently gave an interesting account of his 2,097-mile holiday train journey last Christmas, and illustrated it with many photographs taken during the trip. The illuminated track diagram constructed in connection with the club layout has been tested. Club roll: 10. *Secretary:* L. Ison, 8, Hayes Street, Northcote, N.16, Victoria, Australia.

Thebarton Technical School M.C.—A member of the school staff recently gave a lecture on "*The Making of Oxygen*," and also gave an interesting demonstration of the working of steam and internal combustion engines. Future arrangements include a Model-building Contest, and it is hoped to arrange visits to the Adelaide G.P.O. and to the works of the Western Oxygen Company. Club roll: 39. *Secretary:* B. S. Clarke, 21, Victoria Street, Glandore, South Australia.

CANADA

Rosemount (Montreal) M.C.—The club has recently been meeting at the home of Mr. Rawling, who has a miniature film theatre. Several applications for membership have been received, and the club is making good headway. *Secretary:* L. Tompkins, 5706, 4th Avenue, Rosemount, Montreal.

Rosemount (Regina) M.C.—Many models were built for the club's Annual Exhibition. A Model Railway Section has been formed. A farewell party was given to Master B. Furmage, one of the club's oldest members, who has removed to England, and the members presented him with a fountain pen to mark their appreciation of his services to the club. There has been an increase in membership, and the future prospects of the club are very bright. *Secretary:* J. Watson, 974, Athol Street, Regina.

St. Clair Y.M.C.A. (Toronto) M.C.—Several talks have been given by members, and many models are brought to the club-room to be demonstrated. A very successful party has been held. The club would like to hear from other Meccano Clubs in Canada with a view to exchanging ideas. *Secretary:* W. Cottingham, 471, Concord, Toronto.

NEW ZEALAND

Christchurch M.C.—The club roll is increasing steadily and the attendance is very satisfactory. After a recent cycle outing, the party was led unawares to the new club quarters. This was the first time most of the members had seen the rooms, and the visit therefore provided an excellent climax to a very happy day. Preparations for celebrating the eighth birthday of the club are well in hand. There has been a further exchange of visits between the club and the Ashburton M.C. The club magazine "*The Coupling*" continues to flourish. Club roll: 29. *Secretary:* L. P. Chapman, 24, Braddon Street, Christchurch, S.W.1.

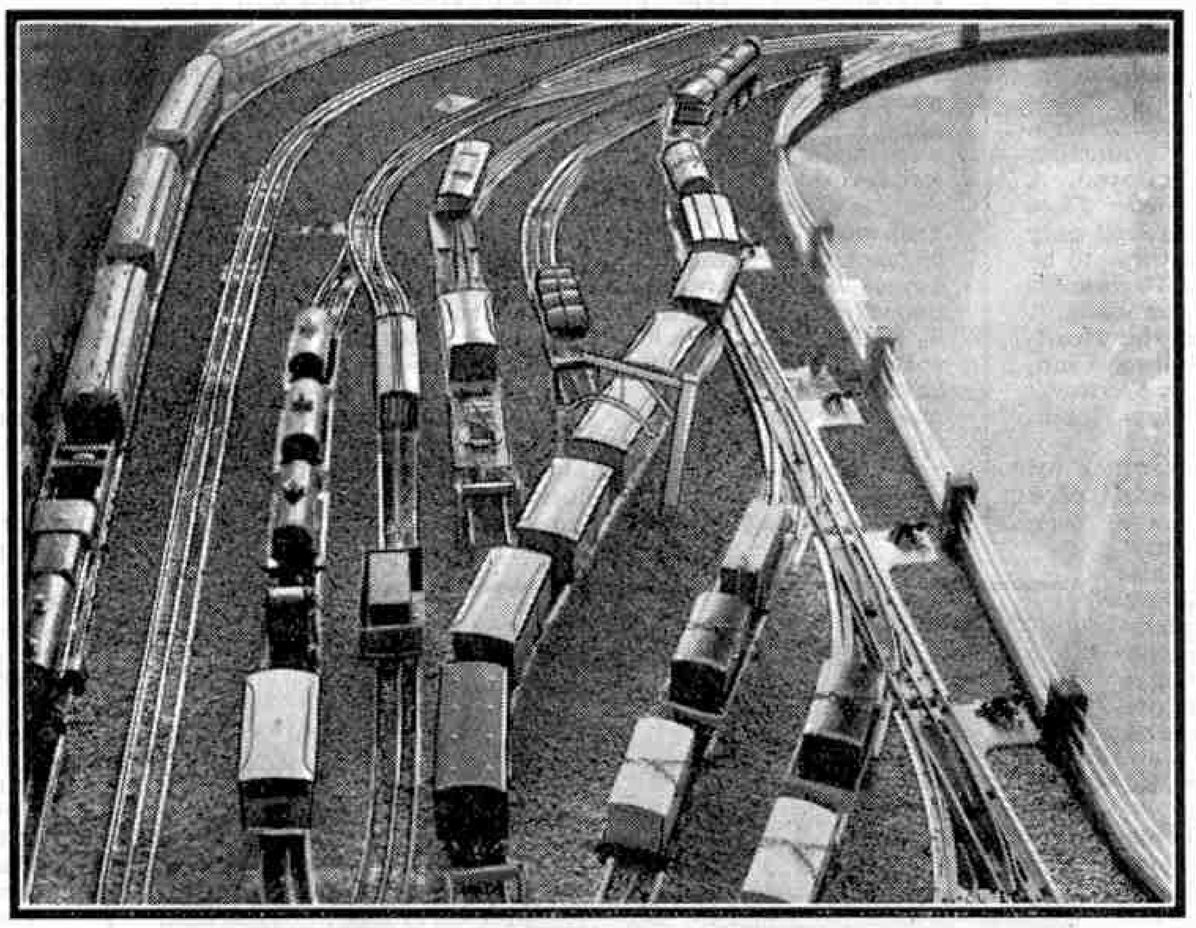
SOUTH AFRICA

Pioneer (Pietermaritzburg) M.C.—Much model-building has been accomplished, and the club staged an attractive Models display at the Maritzburg Amateur Horticultural Society's Exhibition in the City Hall. Club roll: 11. *Secretary:* A. H. Alley, 461, Burger Street, Pietermaritzburg, Natal, S. Africa.

A Fine South African Hornby Railway

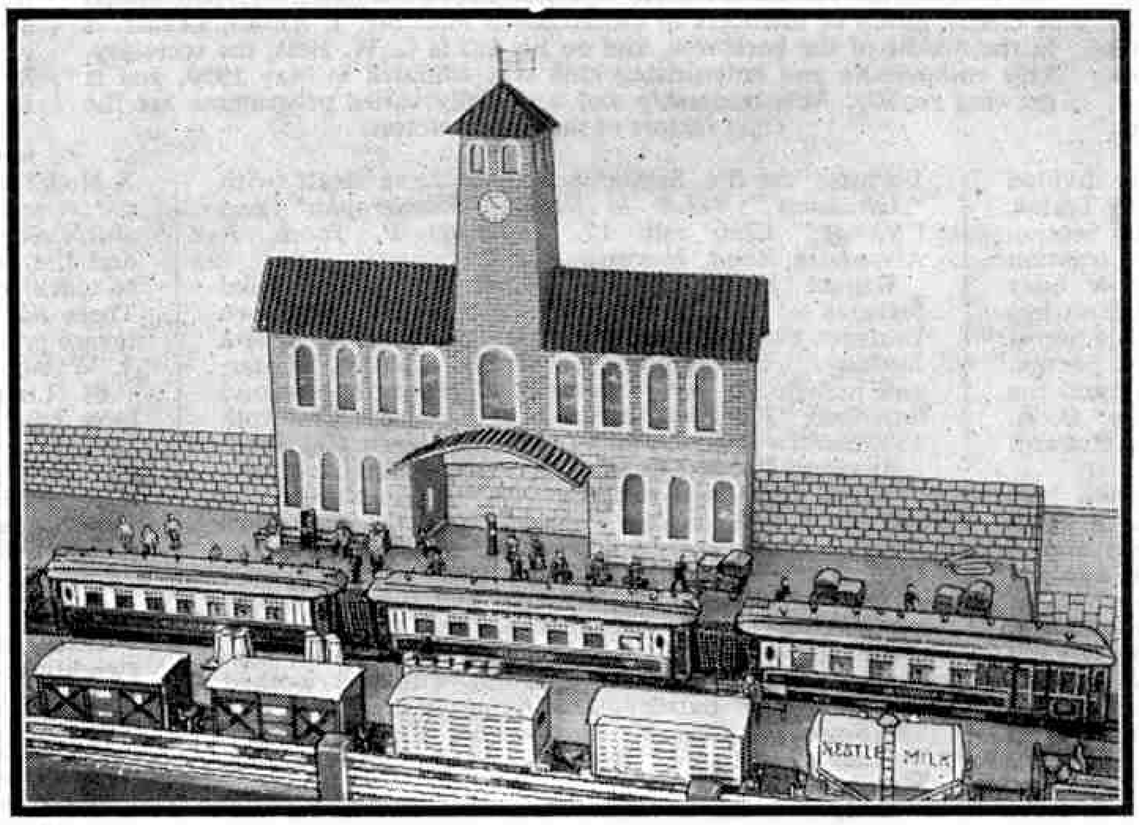
The Layout of Mr. N. V. Pattinson

THE Hornby Railway of which two views are given on this page was designed and laid down by a keen South African reader, Mr. N. V. Pattinson, of Grahamstown, South Africa. His layout represents a combination of South African and British practice, and he is fortunate in that it is housed in a large room, where there is ample space for an extensive goods yard, a large and important station, and other useful additions to the running lines. The walls of the room are decorated with posters issued by the South African Railways and photographs of locomotives, and these help to give the real railway air to the room. The line has been greatly admired by prominent railway officials who have visited it.



Part of the Hornby railway system of Mr. N. V. Pattinson of Grahamstown, South Africa, described on this page. A perishable goods train is leaving the yard, and a passenger express is seen on the main line on the left.

The system is electrically operated and the track, which is composed entirely of Hornby Rails and is 180 ft. long, is laid on a raised platform supported on brackets secured to the walls of the room. There are two main lines running round the entire room. The sides of the outer track are 25 ft. and 9 ft. long respectively, so that there are good long stretches of straight track for fast running. The inner track is a "slow" line, which diverges from the main line and continues as a loop, running parallel with it for three-quarters of the way round the room before joining up again. At one end of the room is an extensive goods yard composed of eight sidings, with the two main lines passing on the outside. The yard has been planned extremely well and many realistic shunting operations are possible.



An interesting view of "Grahamstown," the chief station, with passenger and perishable goods trains drawn up at opposite sides of the island platform.

Motive power is supplied by two Hornby E320 4–4–2 Locomotives; one is lettered to represent the South African Railways and the other is finished in the style of the Great Western Railway of England. The latter is used for operating the passenger traffic on the line, and the South African engine for express freight and ordinary goods trains.

Passenger trains are made up of four Hornby Pullman Coaches. These are particularly suitable, as they closely resemble in general style the type of vehicle seen on such trains as the "*Union Limited*," which runs between Johannesburg and Cape Town, and many other expresses of the South African Railways.

Freight traffic necessitates over 30 trucks and wagons of all varieties. A special feature is made of perishable traffic, and Milk Tank Wagons and Milk Vans make up a very realistic train of this kind. Hornby American type Tank Cars also are used; these are excellent representations of the general type of tank vehicles in use in South Africa.

There are two stations on the line. One is made up of a Hornby No. 2 Station and Passenger Platforms, and represents the usual type of wayside station. The other is named "Grahamstown" and has an important and railway-like air. It has two platforms, one of them an island, and on the main platform are the usual offices and a hotel on which a clock tower is a prominent feature, as can be seen from the lower illustration on this page. Dinky Toy Porters and Passengers play a big part in the life of "Grahamstown," Hikers, Business Men, and other figures representing the varied collection of people that one associates with a station dealing with heavy traffic.

The accessories include Telegraph Poles and a system of signalling operated by means of Hornby Control is in course of installation. It is anticipated also that automatic electric signalling will be brought into use on the fast line at a later date, when the signals will be worked by the passing of the trains themselves.

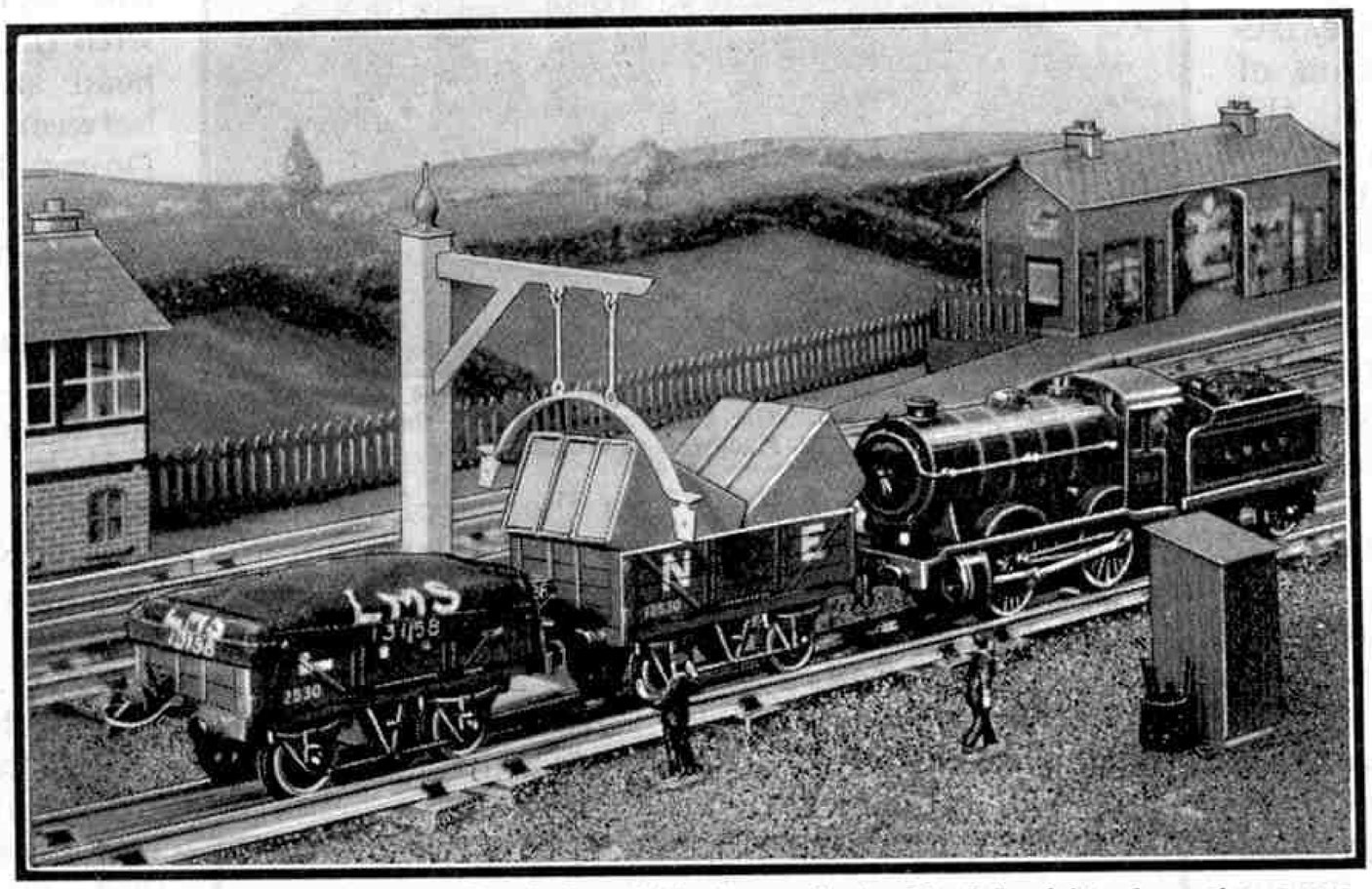
More than 200 lb. of suitable chippings have been used for ballasting the track, and this material has been laid down very evenly over the whole system, to which it gives a neat and pleasing appearance.

Shunting on Hornby Railways

Miniature Pick-Up Goods Trains

MANY boys make their first acquaintance with railway working by watching shunting operations at their local stations. There is a great fascination about the puffing to and fro of an engine used for this purpose. Often it is a small tank, and it makes quite a big fuss as it pulls and pushes trucks here and there, to the accompaniment of the bumping of buffers and the clanking of couplings. The usual result of seeing and hearing this work in progress is a desire to reproduce shunting operations on a Hornby railway. There they are thoroughly in place, and provide really interesting fun for miniature railway owners.

The purpose of shunting is to sort out the various wagons according to their destination, to separate full wagons from empty ones, or to classify them according to the loads they contain. The simplest shunting operations are those carried out by the local goods train at a wayside station, when some wagons are put off and others are collected and taken forward. Operations are more complex at the big marshalling yards, where the traffic from various districts is concentrated and trains are broken up and re-made and sent forward to their destinations.



Shunting at a wayside station on a Hornby layout. The locomotive is a No. 1 Special tender engine, a very suitable type for goods or passenger work.

Owing to space restrictions it is often difficult to reproduce a large concentration yard on a Hornby railway. On the simpler types of layouts, which are invariably continuous in plan, there may be only one or two sidings off the main line where shunting can be performed. The reproduction of the wayside work performed by the ordinary pick-up goods train therefore is the best type of shunting operation to follow in miniature. This runs from point to point, stopping at intermediate stations on the journey, and the load behind the engine is not necessarily very large. Too long a train in miniature looks out of all proportion to its surroundings and loses its realistic effect.

In most districts general traffic forms the greater proportion of the load conveyed by the local pick-up trains, so that the model railway operator has a fairly wide choice in the matter of the composition of his train, especially when the variety of rolling stock available in the Hornby Series is borne in mind. Of course in districts devoted to a particular industry, such as coal, pick-up trains of wagons all of one kind are common sights. An engine, known in Scotland as a "pilot," will make a trip, calling at various colliery sidings in turn to collect loaded wagons, leaving in their place perhaps a supply of empties. The resulting train of loaded wagons will then be worked to a marshalling yard where the individual trucks are sorted and forwarded to their destinations.

A miniature pick-up train can be operated well, even on a layout of small dimensions, and shunting operations can be performed in a satisfactory manner if the necessary siding accommodation is available. On a continuous layout stops can be made at the siding on successive journeys round the track, and in imagination each stop will represent a different place on the route followed. The sidings should be arranged with their points trailing to the direction usually followed by the trains in pursuing their journey. Thus when a train has stopped short of the siding points on the main line the wagons to be detached are uncoupled and the engine can draw ahead with them for a short distance and then back them into the siding.

In order to obtain the greatest amount of fun the sequence of the shunts to be made should be settled and kept in mind by the operator. This may seem difficult at first, but it soon becomes as easy as the operations carried out on real railways appear to be. It is a good scheme to plan the shunts at successive stops in such a manner that the order of the wagons at the end of the trip is entirely different from that at the start. Consecutive numbers should then be allotted to the various wagons, so that it can be seen at a glance if the train is finally arranged in the correct order.

The realism of shunting operations in miniature is increased very greatly if all the rolling stock is in good free-running condition. The axle bearings should be cleaned and oiled regularly, but too much oil should not be used, for the excess would find its way on to the wheel treads and so on to the rails, thus causing a slippery track.

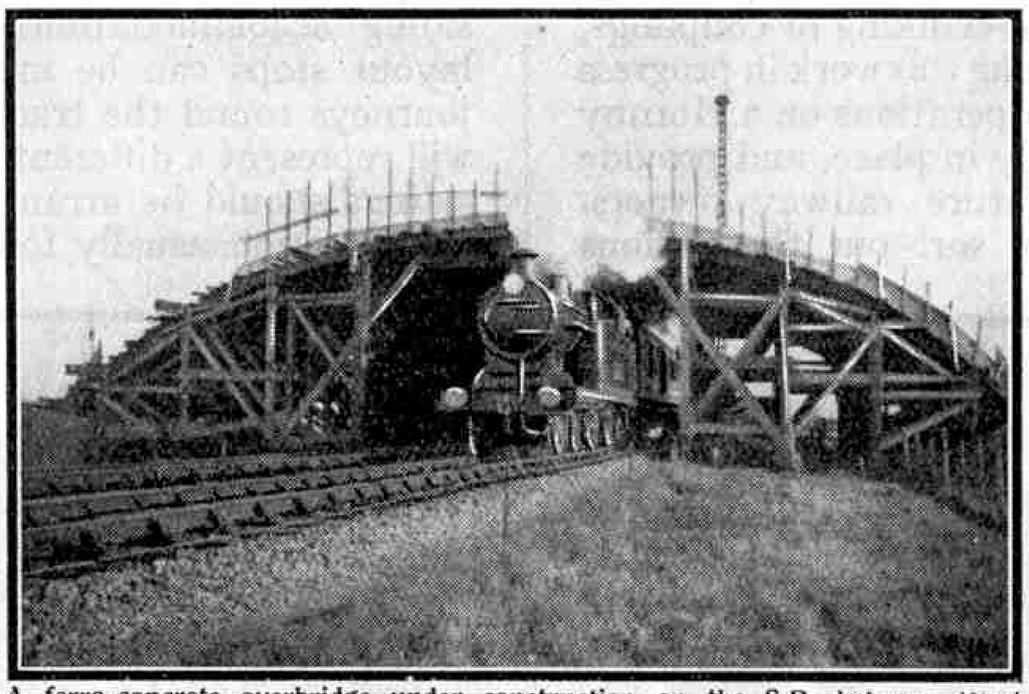
Far easier running is obtained when the vehicles are fitted with die-cast wheels, either of the spoked or the solid Mansell pattern, according to the type of wagon. The use of these and the fitting of Hornby axle-boxes makes the vehicles more realistic in appearance. Hornby train owners who decide to fit axle-boxes to their rolling stock will not experience any great difficulty. The bases of most Hornby Wagons and Vans are pierced with small slots to receive the lugs by means of which the axle-boxes are secured.

Curiosities of Railway Working

Strange Features and Unusual Practices

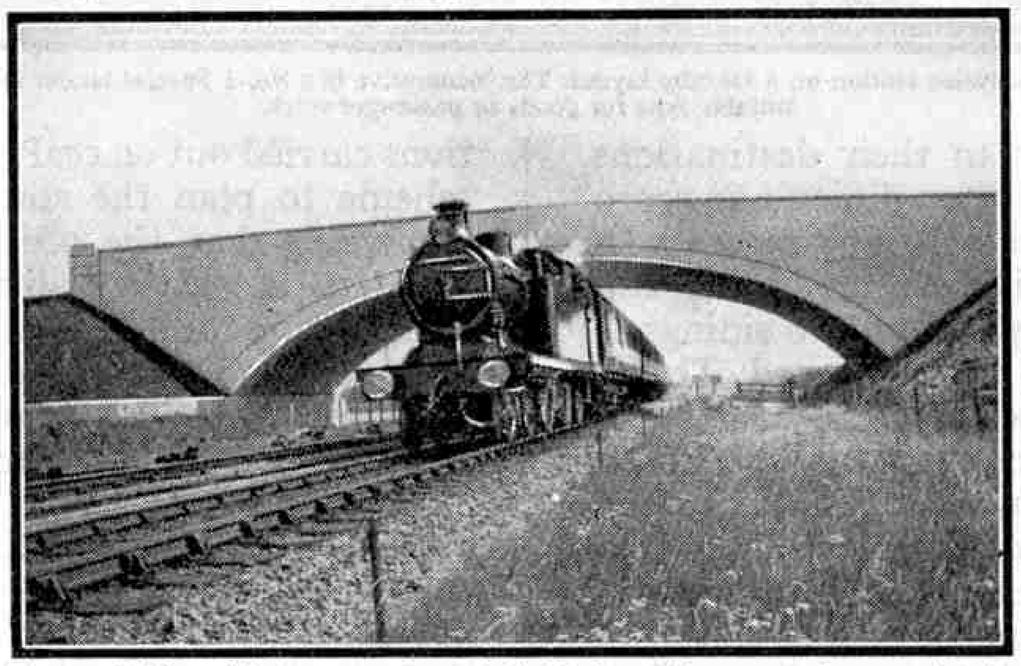
IN the course of travel over British railway systems the keen observer will note many unusual features, and conversation with railwaymen will bring others to light, many with a humorous side to them, but all of great interest. In this article we deal with a few of these remarkable features of railway practice or working.

What a shock we should have if we walked to our railway station one morning to find that although the buildings were there, no trains, tracks or signals were visible! Yet this state of affairs exists at the Dartmouth station of the G.W.R., which is the starting point for a ferry steamer! The explanation is that the River Dart flows between Dartmouth and Kingswear, and passengers from Dartmouth have to cross the river to Kingswear to join the G.W.R. trains there. The station structure is of regular railway pattern and it seems decidedly curious to pass from it to the other side by steamer.



A ferro-concrete overbridge under construction on the S.R. between West Worthing and Goring-by-Sea. The two photographs on this page are by Mr. H. M. Madgwick of Worthing.

While speaking of stations it is interesting to note an amusing practice that was mentioned in *"The Railway Magazine"* some time ago. On the Manchester South Junction and Altrincham Railway, a joint L.M.S.R. and L.N.E.R. concern, the subway at Warwick Road Station forms the only means of crossing the line for the entire distance between Old Trafford and a road bridge at Stretford. Warwick Road is in fact about halfway between the two. Pedestrians wishing to pass from one side of the line to the other are allowed to make use of the station subway on payment of 1d. for the return journey, for which a special ticket is issued!



The overbridge with the concrete work finished and the approaches completed. The train shown is hauled by a 4–4–2 tank locomotive of the former L.B.S.C.R.

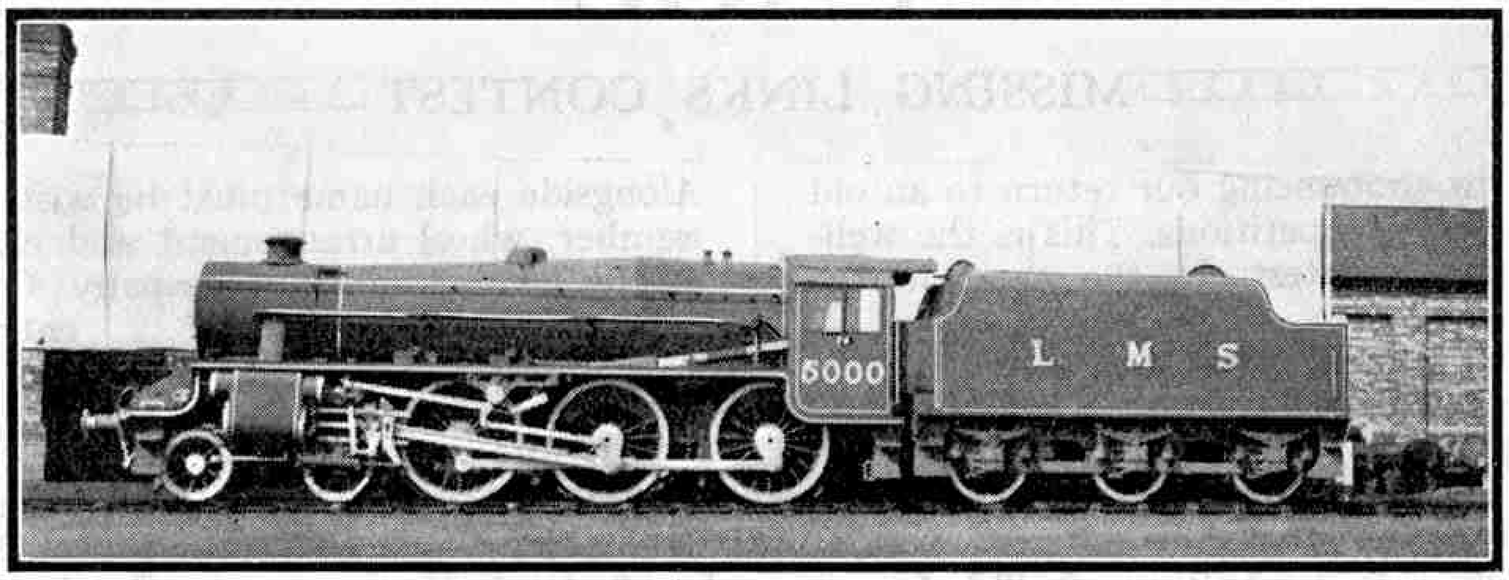
Another and different form of "crossing the line" is encountered on the G.W.R. on the journey from Paddington to Birkenhead. On this run the G.W.R. passes through 11 counties, but as many as 20 county boundaries are crossed during the journey of 210½ miles! For instance, the Oxfordshire boundary line is crossed six times. At one point near Aynho Park Station the driver and fireman on the locomotive of an express train are in Oxfordshire, passengers in the first seven coaches are in Northamptonshire, those in the next two coaches are in Oxfordshire, and the rest of the train and the guard are in Northants.

From Chester to Birkenhead the L.M.S.R. and G.W.R. operate a joint line. So fond of each other do these partners appear that each seems to make a point of providing engines for the other's trains! Some trains of course are G.W.R. or L.M.S.R. throughout and require no comment, but trains of G.W.R. stock can regularly be seen in charge of an L.M.S.R. locomotive and vice versa. An additional complication is introduced by the through services operated by the G.W.R. in conjunction with the S.R. between Birkenhead and Bournemouth, and between Birkenhead, Deal and Dover. These trains are made up of G.W.R. and S.R. stock on alternate days, one train working down on one day and back on the next. On a "G.W.R. day" of course the trains look much like any other G.W.R. train, except perhaps for the use of corridor stock and a restaurant car hauled by a tank locomotive. On an "S.R. day" the handsome green-painted vehicles add still further to the variety of colours to be seen on the joint line. These through trains are always worked by G.W.R. engines.

Approaching Chester the G.W.R. lines from Shrewsbury and the south join up with the L.M.S.R. line from Holyhead at Saltney Junction. This has the curious result that an L.M.S.R. train to London and a G.W.R. train from London both run into Chester in the same direction and on parallel tracks. Other similar instances of the up train of one company running in the same direction as the down train of another company are to be found at Exeter and again at Plymouth. At St. David's Station in the former city the S.R. from Waterloo approaches from the south, but the G.W.R. from Paddington comes in from the north. At North Road, Plymouth, the S.R., having come over Dartmoor, enters from the west, but the G.W.R. comes by the coast and enters from the east. Thus in journeys in the same direction between the same places, two trains can encounter each other twice, in each case running in opposite directions!

The naming of trains is an excellent plan and one that is followed to a considerable extent in railway practice nowadays. The fixing of name boards and destination boards more or less permanently to a set of

coaches can have very curious results when the set or part of it is required for some special duty. This may happen on a Sunday, when their regular working is not in operation, or at other times of extreme pressure of traffic. For instance, a foreign company's stock can sometimes be seen pressed into service to meet some urgent local need. Thus some years ago during the pre-Easter rush a set of L.N.E.R. vehicles working regularly between Newcastle and Liverpool (Lime Street), and bearing appropriate roof boards, were commandeered to form a holiday special to the North Wales Coast.



L.M.S.R. mixed-traffic locomotive No. 5000 posed for its official photograph. The engine and tender are painted grey and lined out with white, and a special screen has been erected to provide a white background. (H.R.C. prize-winning photograph by E. C. Morgan, Wandsworth Common.)

Many similarly strange results can be mentioned, such as the inclusion of a vehicle with the indication "*Continental Express*" in the make-up of a train quite unconnected with Continental travel. Incidentally, owing to the practice of using main line set trains for local work in between their more important turns, it used to be possible for suburban passengers on the old South Eastern and Chatham Railway to travel up to town in a "*Continental Boat Express*" with roof boards complete! The same practice too sometimes led to the daily arrival at Liverpool (Lime Street) of a local train made up of corridor stock bearing the indication "*Liverpool* (*Lime Street*) *Manchester* (*Exchange*) *and Newcastle-on-Tyne*"; and these same vehicles have worked more recently at least once on the "*Irish Mail*" while bearing their "cross-country" roof boards!

The apparent oddities of stock working in this way are emphasised by the retention of the usual names or destination boards when the coaches bearing them are engaged on other duties, thus giving the impression that they have gone astray. Years ago a train was widely reported as having "taken the wrong turning," however. What actually happened was that owing to some mistake a train from Cannon Street to Tonbridge was diverted from South Eastern to Brighton metals at London Bridge. It was not possible to get the train back to its appropriate route without reversing, which would have caused a great deal of trouble at the beginning of the evening rush period. It was decided therefore to send the train on as a special via Redhill and thus return it to its own section. This of course was quite a reasonable way of dealing with the affair with the least possible interference with traffic.

A steam road wagon taking water from a wayside pond or stream used to be a familiar sight, and special hose for the purpose was part of the regular equipment of the vehicle. Railway locomotives can often be seen taking water at stations from the water column or tank, and the picking up of water at speed from track troughs is a regular practice. It is distinctly unusual for an engine to stop and take water direct from a canal, however, Yet this practice has been a regular one on the G.W.R. Bearley and Alcester branch line. The canal is carried over the railway at one point by an aqueduct, and from this the engine of the branch line auto-train replenishes its water supply when necessary!

Old locomotive boilers have frequently been employed for stationary purposes such as supplying steam for operating machinery in railway workshops. Similarly locomotives partially dismantled have often been used as heating units at carriage sidings, in order to warm up the stock in winter before it is worked away to form a train. During last winter G.W.R. No. 3347 of the 4–4–0 "Bulldog" class was so employed at the London Carriage Depot at Old Oak Common. For some time a few years ago an S.R. 0–4–4 tank temporarily withdrawn from service supplied steam for heating and cooking purposes at the Company's hotel by Southampton Terminus station. The two boilers normally used were in need of repairs, and connection was made from the dome of the engine to a pipe line laid down from the hotel. In order to carry the smoke from the chimney clear of the station platforms a long extension was fitted to the chimney of the engine, which thus presented rather a remarkable sight apart from the unusual nature of its temporary duty.



Helping to maintain the permanent way in first-class order near Patricroft. The platelayers are removing fishplates to be oiled so that the rails can slide along them easily when expanding or contracting. (H.R.C. prize-winning photograph by F. Hodson, Bolton.)

More recently a partially-dismantled L.M.S.R. "Big Ben" 4–4–0, No. 14422 "*Ben A' Chaoruinn*," has been employed to supply steam to the District Office and to the laundry serving the station and hotel at Inverness. In this case the engine, being in the open, was not provided with any special chimney.

The L.M.S.R. now own coal seams that will never be mined. They lie beneath the main line at Polesworth, in Warwickshire, where the slack owing to subsidences due to former mining operations is shortly to be removed.

H.R.C. COMPETITION PAGE

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

Join the Hornby Railway Company and become eligible for the competitions announced on this page.

MISSING LINKS CONTEST

We have pleasure in announcing our return to an old favourite among H.R.C. competitions. This is the well-known "Missing Links" Contest. In the panel in the centre of this page are 40 locomotive names from which several letters have been purposely omitted. The missing letters are represented by dashes, and H.R.C. members are set the pleasant task of discovering them, and thus of finding the names of the locomotives. At first sight some of the mutilated names may appear bewildering, but all the engines are well known and the letters shown in each case are a sufficient clue for keen H.R.C. members. Their knowledge of locomotives and a little perseverance will enable them to solve the puzzle with comparatively little difficulty.

When competitors have discovered all the names, or as many of them as they can find, they should make a list of them in the order in which they appear in the panel. Alongside each name must be written the locomotive's number, wheel arrangement and class, and the initials of the owning railway company. On the back of each entry must be written the competitor's name, full postal address and H.R.C. membership number.

--r -r-d---c- -a--i--n	---lin--l-oc- -as--e
D--b-et-n -al-	S-. Jo-ns-o-n
-u-ra-en ---t-e	D--al- -al--t-y
S-- -a- -a-	-ac--o-t-
G-a-g-- -e-ma-r-	C--n-i--a C----
-i- -o-n -a--in-	-i-c--n- -h-r--i-l
-ui---il-e-	-r-nc- -en-y
N-a--l-nd	-l-n -a--e--i-
-ra-le---	Lo-- E-i--t
-erl--	--ee- -l--a-d--
S--k-r-s-i-e	-ar-- -- B-a-w--d-n-
--- S--int--d-l-	--- --ee- -n----
-o-- -e-	--- -o-e-- -or--
Lo-- -a--oc-	--een -r-o-
L--- --tr-ci-	-ou--e--
Br----t-n -----e	P-i--- -up--t
Qu--- --i--ve--	-ol---re-- -uar--m-n
--- D--g-- -r-t-r	-in- J---
---t -a- ---t-d	Lo-- -re---e--
-e--y -a--e-	-ut-o- -e-t--r--

The contest will be divided as usual into two sections, Home and Overseas, and in each section will be awarded three main prizes consisting of Hornby Train or Meccano products to the respective values of 21/–, 15/– and 10/6. In addition, several consolation prizes will be awarded. In the event of a tie for a prize, general neatness will be taken into consideration when the judges make their final decision.

Envelopes containing entries must be marked "*H.R.C. July Contest,*" and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st July. The Overseas closing date is 30th October.

Railway Photographic Contest No. 4

This month we continue our 1937 series of contests for photographs of railway interest. The rules to be observed are exactly the same as those governing previous contests, but for the benefit of those competitors who are newcomers, we add that each competition in the series is a separate one, and that any number of entries may be submitted in each. The only restriction is that the actual exposure must be the work of the competitor himself; developing and printing may be carried out by a professional. On the back of each print must be written the competitor's name, full address and H.R.C. membership number, and a short description of the scene of the picture must also be given.

The contest will be divided as usual into two sections, Home and Overseas. Two sets of prizes will be awarded in each section, and they will consist of Hornby Train or Meccano products to the respective values of 21/–, 15/– and 10/6. Any prize-winner requiring photographic material as his prize may choose this instead of Meccano products. Several consolation prizes also will be presented.

Competitors who desire their entries to be returned, if unsuccessful, should enclose an addressed envelope of suitable size, sufficiently stamped. It should be noted that prize-winning prints become the property of Meccano Ltd., and are not returnable.

Envelopes containing entries must be marked "*H.R.C. Photo Contest No. 4*" in the top left-hand corner and posted to reach Headquarters at Meccano Ltd., Binns Road, Liverpool 13, on or before 31st July. Overseas competitors must arrange to post their entries so that they arrive at Headquarters not later than 30th October.

March "Locomotive Problem" Solution

(1) Smoke-box saddle. (2) Smoke-box door locking handles. (3) Steam pipe cover. (4) Casing for atomiser shut-off cock. (5) Sand-box filler cap. (6) Top-feed cover. (7) Safety valves. (8) Stay bolt head cover. (9) Reverse rod. (10) Tender locker. (11) Division plate of tender. (12) Screw coupling. (13) Guard iron. (14) Cylinder cock pipes. (15) Piston valve chest. (16) Piston rod. (17) Union link. (18) Slide bar bracket. (19) Connecting rod. (20) Expansion link bearing cap. (21) Return crank. (22) Coupling rod. (23) Balance weight. (24) Tender axle-box. (25) Cab door.

COMPETITION RESULTS

HOME

May "Voting Contest."—First: F. Hagger (51347), St. Johns, London, S.E.8. Second: E. R. Dudley (37680), Carshalton, Surrey. Third: J. Bainbridge (49961), Birkby, Huddersfield. Consolation Prizes: M. Colson (30227), Bassett Green, Southampton; G. Harland (52757), Boothstown, Nr. Manchester; M. L. Harper (8718), Harringay, London, N.4.; J. Riddle (24390), Bromley, Kent; G. R. Davies (47020), Pen-Y-Maes, Hollywell, N. Wales; A. Drapes (53315), Penrhyn Bay, Caernarvon; M. Hoskins (16653), Exeter.

May "Railway Photo Contest No. 2."—First: D. Fear (18477), Taunton, Somerset. Second: A. Donaldson (6868), Belfast. Third: C. Spencer (44179), Sheffield, 6. Consolation Prize: H. S. G. Darke (4461), Hampstead Garden Suburb, London, N.W.11.

The entry submitted by the winner of the first prize was unusual because there were no trains in it, the scene showing a track and signals. All the other entries illustrated either trains or locomotives, and most were excellent, although a few ambitious efforts to photograph trains travelling at high speeds resulted in blurred prints.

OVERSEAS

February "Missing Words Contest."—First: W. S. Eagle (31779), Byculla, Bombay, India. Second: A. McIntyre (30925), Winnipeg, Manitoba, Canada. Third: D. Murison (37642), Buenos Aires, South America. Consolation Prizes: D. H. Spargo (53098), Johannesburg, South Africa; J. C. Carter (46374), Capetown, South Africa; G. Healy (43145), Winnipeg, Manitoba, Canada; W. Carpinter (42509), Sumner, Christchurch, New Zealand; R. A. Wragg (7913), Bandikui, Rajputana, India; R. Pearson (29199), Victoria, Australia.

February "Drawing Contest."—First: S. D. Kurlawalla (28724), Bombay, India. Second: J. M. Demanuele (44225), Valletta, Malta. Third: N Söderberg (43551), Falun, Sweden.



Branch News

NORTHAMPTON.—The Branch organised an Exhibition in connection with the Northampton Y.M.C.A. Coronation Bazaar. The chief attraction was an electric layout, provided with suitable scenic effects and illuminated by 75 small electric bulbs, on which timetable services were operated by nine locomotives. There were 300 visitors, many of whom willingly paid 1d. for the privilege of making a design on a Meccanograph built by members. The second Anniversary Night of the Branch was opened with a banquet, kindly provided by the Chairman, to whom a hearty vote of thanks was accorded. A summary was then given of activities during the past year, and the Summer Session of 1936 was dealt with in detail, the story being illustrated by photographs shown on a reflectorscope. An interesting Lecture on *"Locomotives"* has been given by the Rev. P. F. Wright. Secretary: D. K. Adams, 8, Cedar Road, Northampton.

WIMBORNE GRAMMAR SCHOOL.—Track operations have been keenly carried out, and working has been smoother since the completion of the installation of the lighting and signalling systems. The enforcement of rules has resulted in a considerable improvement in the running of meetings, and the number of fines has accordingly diminished, to the treasurer's disappointment. The goods yard is to be electrified to facilitate shunting, and scenic effects are to be improved. Secretary: P. Annen, Queen Elizabeth's Grammar School, Wimborne.

FOLKESTONE.—Easter services on the Branch track included the running of special mail vans on the *"Midnight Mail"* from "Victoria" to "Folkestone Junction," and a number of heavy goods trains. *"The Continental Express"* was run every 15 minutes from "Victoria" to "Folkestone Harbour." High speeds were maintained during this period of heavy traffic. Constructional work has been confined to the production of a number of new telegraph poles. Secretary: F. E. Saunders, 79, Dover Road, Folkestone, Kent.

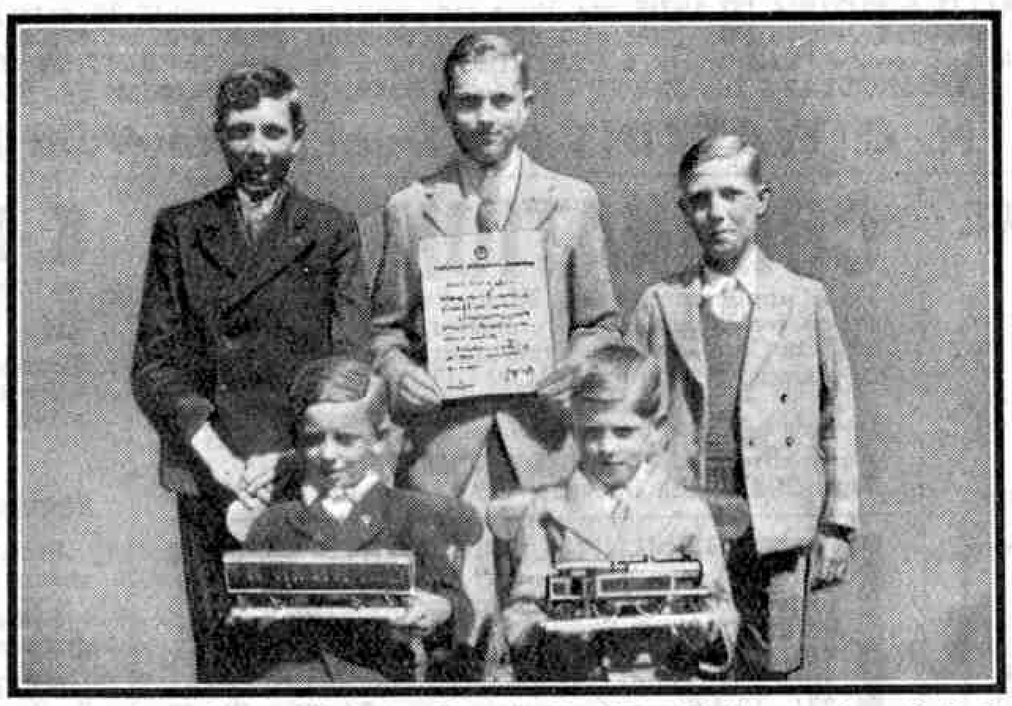
GRAMMAR SCHOOL (BURNLEY).—A large layout arranged for the School Hobbies Exhibition was a great attraction to visitors. The track was continuous, and two termini each with three branch lines were laid down. A model town occupied the centre of the layout, together with appropriate Dinky Toys. Secretary: W. Baker, 14, Stoney Street, Burnley.

WANDSWORTH No. 1.—The Branch layout has been re-designed, resulting in improved track operations. Timetable working has been tried out, the average duration of service being 25 seconds. Efforts are still being made to obtain a larger club-room, as lack of space is preventing much desired developments. A Library has been formed and already contains 50 books. A member has lent a cine-camera and film to enable a short film to be produced by members, who are at present engaged in writing the story for it. Swimming and cricket are included in the Branch programme. Secretary: A. H. St. S. Walker, 68a, Oakmead Road, Balham, S.W.

ISLINGTON.—Meetings have been devoted to experiments in train operation and in the design of layouts, in preparation for the Exhibition. One member gave a demonstration of his Microscopic Projector. Readings on "Schools" class locomotives of the Southern Railway, and the Air Police of Palestine and Egypt respectively, have been enjoyed. Members spent an interesting afternoon at the Model Railway Exhibition at Westminster. A visit to the Neasden L.M.S.R. engine shed is proposed. Secretary: A. D. Straker, 48, Onslow Gardens, Muswell Hill, N.10.

LOSTOCK GRALAM.—Interesting track operations were carried out on the Branch layout in preparation for the recent Exhibition, the success of which demonstrated the value of these rehearsals. Visitors were greatly interested in operations, and also in the numerous Meccano models displayed. The layout was redesigned after the Exhibition and timetables were rearranged. Outdoor meetings are now being held, and members are constructing a raft for use on a nearby river. A "Patents Office" has been opened in order that good ideas in connection with mechanisms can be registered, and the Registrar has already been overwhelmed with applications from inventors. Secretary: A. Milligan, Wincham Hall, Northwich.

ACTON.—Following the removal of Branch Headquarters to a more suitable club-room, members have been busy relaying the track to a design evolved by the secretary and treasurer. The track was first laid temporarily on the floor and tests were carried out. It was then raised 6 in., and finally, having undergone further tests, was raised to table height and fixed in position. Great activity continues in connection with completion of scenic effects for the layout. Visits have been paid to the Model Railway Exhibition at Westminster, and to Willesden Motive Power Depot. New members have been enrolled, following the insertion of an advertisement in a local newspaper, and further recruiting efforts are being made. Secretary: S. Simmons, 7, Alfred Road, Acton, W.3.



A group of members of the Dover Branch, No. 220, with the secretary, D. F. E. Moore, in the middle of the back row. On the right in the front row is D. Moore, the youngest member. The Branch was incorporated in February 1932, and has specialised in track meetings.

Branches in Course of Formation

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested and desirous of linking up with this unique organisation should communicate with the promoters, whose names and addresses are given below:

AUSTRALIA—T. J. Dewhirst, 25, Stuart Road, Prospect, Victoria.
REDHILL—I. J. Leach, 53, Warwick Road, Redhill.
BRIDLINGTON—P. Davidson, "Morningside," 7, Third Avenue.
SLOUGH—L. Jackling, 28, Melbourne Avenue.
GLASGOW—R. W. Brash, 97, Springfield Avenue, Pollokshields, S.1.
NEW MALDEN—J. Howard, 11, Mount Pleasant.
BANBURY—J. Prescott, 6, Twyford Grove.
LEAMINGTON SPA—J. Cowley, "Elmsdale," 9, Clapham Terrace.
ST. LEONARDS-ON-SEA—J. L. Alder, 158, Old Church Road.
SALFORD—R. Tonge, 12, King Street, Pendleton, 6.
CHELMSFORD—W. Manning, "Delight," Avenue Road.
ILFORD—Mr. J. A. King, 106, Cowley Road.
WATFORD—C. Weston, 6, Limes Avenue, Alfreton, Derbyshire.
SOUTH AFRICA—R. H. Watkins, "Silwood House," 91, Aliwal St., Bloemfontein.

Branch Recently Incorporated

325. LEIGH-ON-SEA—J. Melling, 84, Chalkwell Avenue, Chalkwell, Essex.

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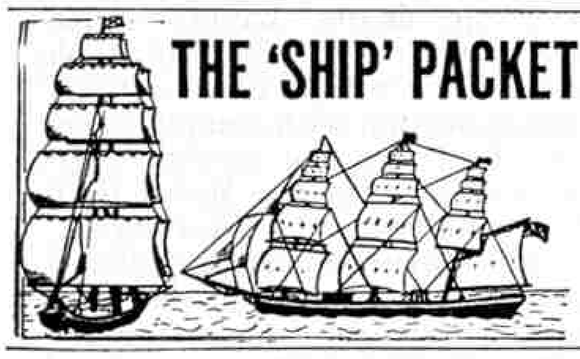
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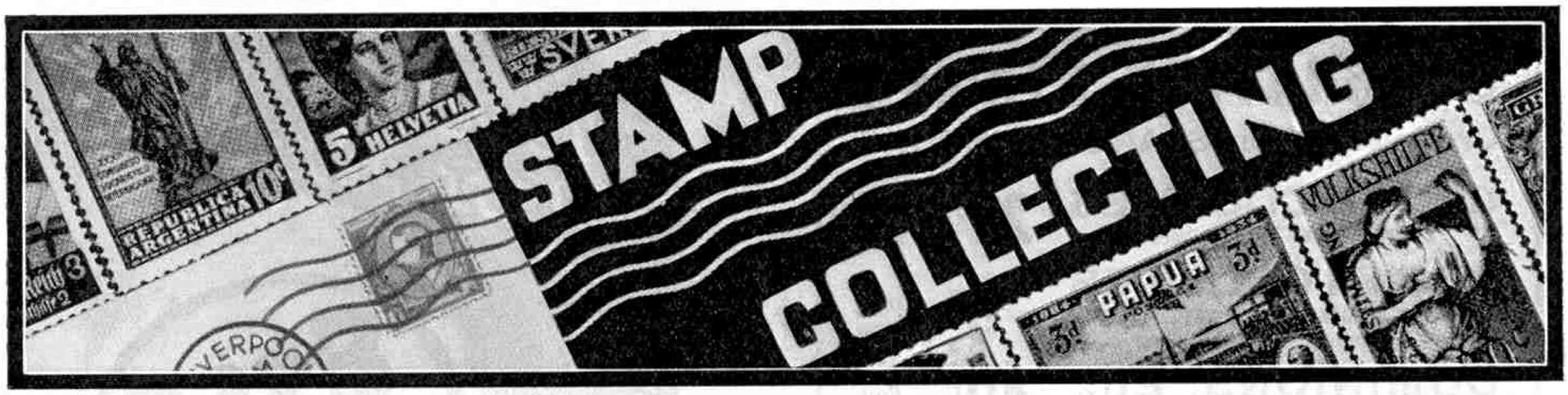
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THE STAMP COLLECTION IN SUMMER

MANY young stamp collectors regard their hobby as one for winter only. At the first approach of summer they pack their albums, mounts and catalogues away in an old box or desk, and leave them there untended until the first chill evening winds of autumn suggest that an indoor job by the fireside is preferable to a cycle run around the lanes.



We too prefer to spend leisure summer hours out of doors, but we also manage to devote quite a lot of time to our stamps during the summer. After all, stamp collecting is an ideal hobby for those summer hours when sudden rainstorms drive one from the garden, for it does not call for the use of a lot of space or for elaborate preparation.

This year it is particularly important that interest in stamp collecting should be maintained throughout the summer. There are Coronation commemorative stamps to be collected, and most of them will be obsolete long before the winter sets in. The Coronation stamps will be followed by the new definitive King George VI stamps, some of which are already out. In addition there will be many foreign issues, and indeed the flow of new stamps this summer will be so great that it will be almost impossible to keep up with them if they are ignored until the winter comes along.

Many matters other than new issues can conveniently be dealt with in the summer. A typical job we carried through a year or two ago was the sorting of an accumulation of duplicate pictorial stamps we had acquired. These were arranged into a series of collections, one illustrating bridges, another ships, another birds, and so on. Almost every collector finds his stock of duplicates increasing, and this will suggest to him one way of putting them to good use.

Each year we have the privilege of examining many collections compiled by boys. Many of these are sources of great pride to their owners, but others contain so many torn and dirty specimens of common issues that their appearance is entirely ruined. The difference in value and appearance between a collection of stamps in good condition and one containing any old stamps, so long as they fill space, is so great that every collector should give some thought to the matter.

Perfect condition in an unused stamp requires that it shall be in "mint condition"; that is, exactly as it left the printer, bright, clean, uncreased, with its gum untouched and, in perforated issues, with all its perforation teeth intact. Imperforate stamps must have margins as wide as possible, and no part of the frame around the design must have been cut in separating the stamp from the full sheet.



In used stamps, the word "fine" usually indicates perfect condition. Here again freshness, clearness, absence of creases, and untouched margins apply, and in addition there should have been no thinning of the paper in the removal of the stamp from its cover. The postmark should be light and should not obscure any vital part of the design.

In both used and unused stamps it is important that the design should be well centred between the margins.

A collection in which every stamp satisfies all these conditions is something to prize, but many young stamp enthusiasts often depend upon gifts of stamps from friends and do not always get perfect stamps. They can make it a rule to exclude torn stamps and those that are so dirty as to be eyesores, however. Even a novice soon finds that his interest dwells only on the clear clean specimens as he turns over the pages of his album. He passes quickly over the ugly stamps.



Readers who know that their collections contain stamps that are below reasonable standards should go through their albums this summer and take out all the poor specimens that have been put in to fill up space. They also should clean up those stamps that have paper adhering to them, or are soiled or creased or dirty. These operations are simple, provided that reasonable care is taken.

Paper can be removed from the backs of stamps by floating them face upward on water in a dish or putting them on a pad of damp blotting-paper. Soon the paper becomes moist enough to be peeled away from the stamp. Water should not be allowed to get to the face of the stamp, and the unwanted paper should be removed as soon as it will peel off easily, so as to avoid water soaking through the stamp itself. The reason for this is that many stamps are printed with ink that will run if in contact with water. Others are printed on chalky surfaced paper that also is badly affected by water.



The illustrations on this page show some of the stamps issued to commemorate the coronation of their Majesties King George VI and Queen Elizabeth. Reference to the designs is made on the "Stamp Gossip" page.

The "cleaning" of stamps we suggest is legitimate and is not faking. It consists simply of restoring the colour of faded stamps by brushing them lightly with peroxide of hydrogen, a harmless chemical that is to be found in most homes. A camel hair brush dipped in the liquid should be used for this purpose. Other stamps that are dirty may be lightly brushed, not rubbed, with benzine. Those that have grease spots on their surface can be satisfactorily treated by placing them between dry blotting-paper and ironing with a hot iron. The hot iron also comes in useful for removing creases, but in this case slightly damp blotting-paper must be used.

Careful attention to the points that we have suggested in this article will effect a very marked improvement in the appearance of the collection, and readers who take our advice will find next winter that their stamps give them more pleasure than ever they have done before.

In the meantime those readers who would like our help or advice in planning a more thorough re-organisation of their collections are invited to put their problems before us. The *"M.M's."* stamp section is planned to be of practical service to young stamp collectors and the Editor will be glad to answer any stamp collecting queries that readers care to address to him. The only service he cannot undertake is the valuation of stamps.



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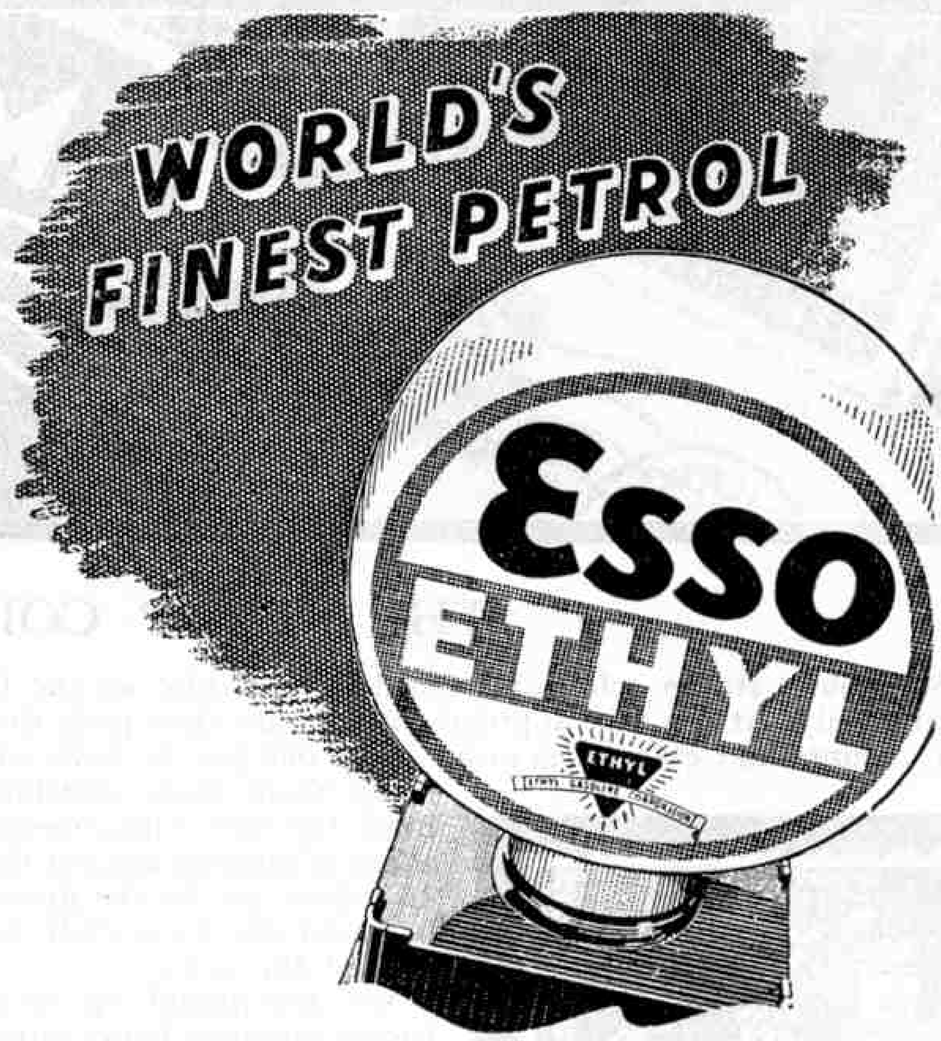
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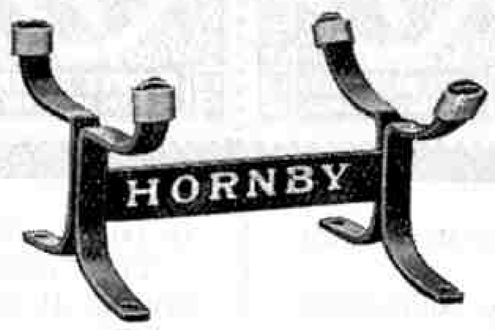
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How to obtain the "M.M."

The *"M.M."* may be ordered from all Meccano dealers, or from any newsagent or bookstall. Price 6d. per copy. Direct subscriptions to this office will be at the rate of 4/- for six, or 8/- for twelve issues. As a rule, back numbers cannot be supplied, because we print only sufficient copies to fill our standing orders. To prevent disappointment, therefore, place a regular order either with your dealer, newsagent, or direct with this office.

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SOMETHING BESIDES A FREE GIFT!

Every advertiser says you must ask for his approvals when requesting a free gift, yet how many tell you anything about them? Here are particulars of mine: They consist of stamps mainly arranged in sets, although priced separately. There is a large percentage of pictorials and there are varieties priced to suit all pockets. There is a good discount and a large range to select from. Then I give the complete set of King George VI Great Britain Coronation stamps, overprinted for use in the three Morocco Agencies, to all collectors who enclose 2d. postage and seriously mean business.

R. D. HARRISON — ROYDON — WARE



Stamp Gossip

and Notes on New Issues



Travancore Temples Issue

The new Travancore series probably is the most interesting Indian Native State issue that has appeared for very many years. It commemorates the Maharajah's proclamation that in future all the Hindu temples in his State shall be thrown open to the "untouchables," who in the past have always been excluded from the temples of the higher castes.



There are four stamps in the series. The 6 cash value show a portrait of the Maharajah of Rama Varma and a view of the inner shrine of the Subramania Temple at Trivandrum. In the middle of the design can be seen the statue of Subramania, the Hindu god of Beauty, Success and Bravery. The remaining three designs are in similar style, each bearing the Maharajah's portrait but showing views of different temples as follows: 12c., the famous Sri Padmanabha Temple, which appears on one of the stamps in the Indian 1935 Silver Jubilee issue; 1½ch. Mahadeva Temple; 3 ch. Kanyakumari Temple.

Trace Horses and Stamps

Many readers who were interested in the story of the trace horse stationed at Tower Hill in London, related in our June "General Interest" page, would no doubt like to help the People's Dispensary for Sick Animals of the Poor, which maintains this horse. They can do so by sending gifts of unwanted duplicate stamps, or silver paper, to be sold for the benefit of the funds of the P.D.S.A. These should be sent to the Secretary, P.D.S.A., 14, Clifford Street, London, W.1.

King George VI Definitives

Preparations for the King George VI definitive stamps are going forward now and already several of the Colonies have announced their intentions.

In the majority of cases, Ascension, Grenada, Kenya, Uganda and Tanganyika Union and the Straits Settlements, for example, it is intended to retain most of the existing pictorial designs, but the royal portrait will be changed, of course. The opportunity will be taken to replace certain redundant values and unpopular designs, however.

Coronation Stamp Designs

This month we are able to illustrate the remaining important Coronation stamp designs to which reference was made in our previous articles on Coronation stamp issues.

The most interesting design, of course, is that used for the Crown Colonies issues, and it is notable for its inclusion of several of the Coronation emblems. In the centre of the stamp is St. Edward's Crown, and beneath the Crown are the Orb, the Sceptre with the Cross and Sceptre with the Dove. In the panel on the King's left is the Sword of State, one of the five ceremonial swords, while in the panel on the right of the Queen is the Queen's Sceptre with Cross.

The Southern Rhodesia design shows the Victoria Falls and a locomotive crossing Victoria Falls bridge spanning the river Zambesi. The South West Africa design shows a simple portrait of the King, flanked by palms and surmounted by a rather tiny crown. The set consists of eight values, from ½d. to 1/–, in bi-lingual pairs, English and Afrikaans inscriptions alternating as shown in our illustration.

The Australian stamps, shown on page 435, are not Coronation issues, but are the first of the new definitive series, the 1d. value showing Queen Elizabeth, and the 2d. King George.

* * *



The International Scout Jamboree to be held this year in Holland, to which we referred in our "Stamp Gossip" notes last month, is the subject for a commemorative stamp issue in the Dutch Indies. There are two stamps, 7½c. and 12½c. each using the design shown here.

* * *

We reproduce here the recently-issued Belgian "Queen's Appeal" issue bearing portraits of the late Queen Astrid and Prince Baudouin. The set consists of eight stamps, each bearing a premium to be devoted to the Queen Astrid Public Charity Fund.

* * *

First Flight Covers

Imperial Airways have found it necessary to stop forwarding and collecting covers transmitted on important first flights operated by them and their associated companies. The reasons are that the work has grown to large proportions, although it is not part of the Company's normal activities.

Imperial Airways will be willing to answer philatelists' enquiries concerning air mail services, of course.



French Colonial Issues

Six stamps have been issued in each of 21 French colonies to commemorate the Paris International Exhibition.



We illustrate the 20c., showing various modern transport methods used to bring colonial produce to market, and the 50c., representing types of colonial labour. The other designs are as follows: 30c., old-time trade ships; 40c., types of native women, with a view of Paris; 90c. torch bearers; 1f. 50c., native carvings of idols.

We illustrate also one of the very striking designs used in the new series issued in French Equatorial Africa. This shows a native lumberman on a log raft on the river Mayumba.

The full set comprises 24 general issues and 8 air stamps, with designs showing native life and a range of portraits of famous French colonists, including the Count de Brazza, Emile Gentil, and Paul Crampel.

Air Pioneer Commemorated

Two stamps have been issued in France to commemorate the pilot Jean Mermoz, who lost his life in the South Atlantic on 7th December last when flying the Air France air mail liner *"Croix du Sud"* from Dakar to Natal. Jean Mermoz was the most famous of all pilots on the South Atlantic crossing, and it was largely due to his pioneer work that the service was finally established. He was the first Air France pilot to make the ocean crossing.

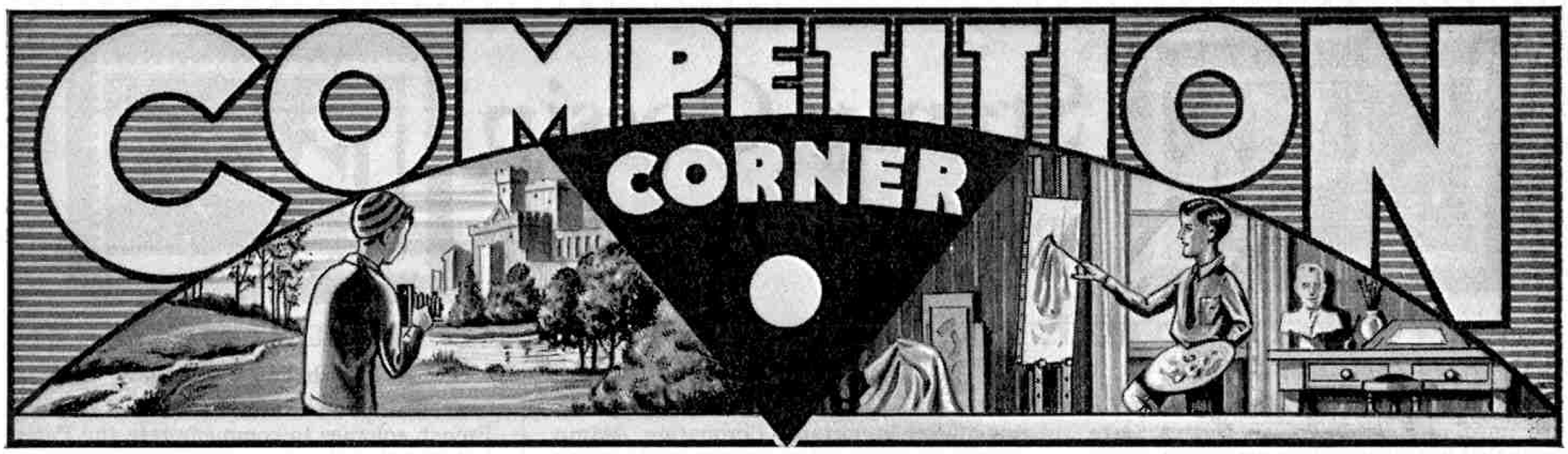
We illustrate the 30c. stamp, which shows Mermoz at the wheel of a mail liner. The second stamp, a 3 fr. value, shows a proposed memorial plaque of the dead aviator's head.

Dutch Summer Charity Stamps

Following the custom established in 1935, Holland issued last month a series of four charity stamps, each bearing a premium for social and cultural funds.

The designs are devoted to portraits of famous men of science or learning.

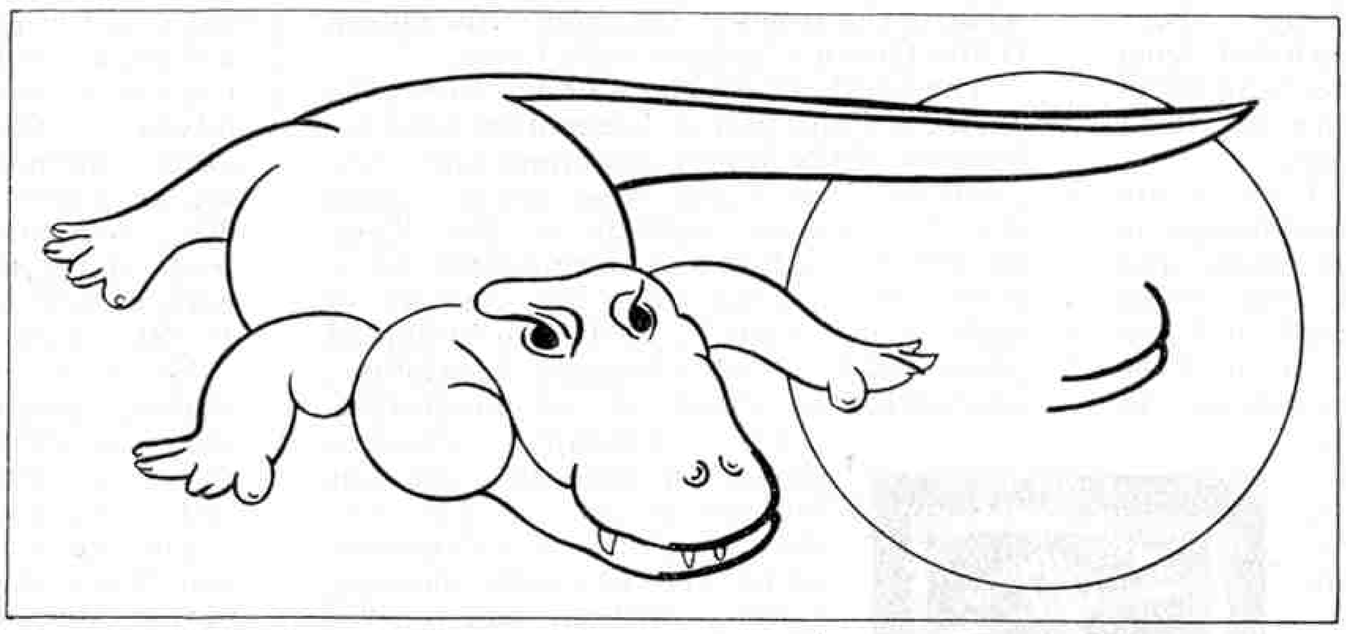
We thank Stanley Gibbons Ltd. for their courtesy in loaning the stamps from which the illustrations or our stamp pages have been made.



ANOTHER SKETCHOGRAM CONTEST

Sketchograms have always proved popular competitions with our readers and because they are an ideal way of filling in those odd rainy hours that seem inevitable in the English summer, we are setting another contest of that type this month.

No artistic skill is necessary in this competition, and every reader can take part; all that he is asked to do is to make a sketch in which occurs the simple line shown in the circle on the right of our illustration. The line must form an essential part of the outline, as in the sketchogram reproduced in our illustration in order to make this explanation perfectly clear. There the line forms part of the outline of the jaw and mouth of a crocodile.



The sketchogram line may appear in the sketch as many times as the competitor likes and may be tilted to any angle or turned on its back as necessary. The crocodile drawing on this page must not be copied, of course, but there are no other restrictions as to the subject or nature of the drawing.

It should be emphasised that a bold and simple drawing in which the sketchogram appears only once and is immediately obvious, will stand a better chance of success than a complicated drawing in which it appears several times merely as a minor feature.

Competitors may submit as many drawings as they wish, but each must be on a separate sheet of paper and on the back of each sheet the competitor's name, age and address must be given. In order to give our younger readers an equal opportunity of gaining a prize the entries will be divided into two sections, A for readers aged 16 and over, B for those under 16. Prizes of Meccano Products value 21/– and 10/6 respectively, will be awarded in each section.

Entries must be addressed "Sketchograms, Meccano Magazine, Binns Road, Liverpool 13," and must arrive not later than 31st July.

A similar set of prizes will be awarded in exactly the same conditions in the Overseas section, entries in which must arrive not later than 30th October.

July Photo Contest

As announced in the April *"M.M.,"* each month until September next we are offering prizes for the best and most interesting photographs submitted during the month.

The prizes will be awarded each month to the best photographs submitted, the only restrictions being that the exposure shall have been the work of the competitor himself and that each print must bear a title.

The entries will be divided into two sections, A for readers aged 16 and over, B for those under 16. Prizes of Meccano Products or Photographic Materials, if the winners prefer, value 21/– and 10/6 will be awarded in each section.

Entries in the July competition must be addressed "July Photo Contest, Meccano Magazine, Binns Road, Liverpool 13," and must reach this office not later than 31st July. Overseas entries must arrive not later than 30th October.

Competition Closing Dates

HOME

July Photo Contest	... ...	31st July
July Sketchogram Contest	...	31st July

OVERSEAS

April Crossword Puzzle	...	31st July
April Photo Contest	... ...	31st July
Coronation Eye Teaser	...	31st August
May Photo Contest	... ...	31st August
June Photo Contest	... ...	30th September
June Crossword Puzzle	...	30th September
July Photo Contest	... ...	30th October
July Sketchogram Contest	...	30th October

Watch the Closing Dates:

Competitors, both Home and Overseas, are particularly requested to make a careful note of the closing dates of the competitions.

Entrants to drawing and similar competitions should note that unsuccessful entries can only be returned if a stamped addressed cover is sent with the entry.

COMPETITION RESULTS

HOME

Coronation Eye Teaser.—1. D. H. Thompson (Stockport). 2. J. E. McCulloch (Maybole). 3. J. H. Wigston (Leven). 4. H. Ferguson (Beith). Consolation Prizes: R. L. Ambler (Leeds, 9); R. J. Biggs (Bristol, 6); R. H. Bunnett (Taunton); D. G. Campbell (London, N.11); R. L. A. Firman (Sheerness-on-Sea); A. M. H. Lewin (Wimborne); W. McAvoy (Crieff); J. Rea (Huyton); F. F. Round (London, S.W.18); F. Smith (Liverpool, 19); J. W. Speechly (Gidea Park); D. Turner (Tewkesbury); E. F. Goodsman (London, S.E.13); D. S. Wallis (London, N.4).

May Photo Contest.—First Prizes: Section A, A. B. Bishop (Bristol); Section B, O. M. V. Argles (London, S.W.15). Second Prizes: Section A, F. H. Culverhouse (Sheffield 7); Section B, W. McCorkindale (Glasgow, W.1). Consolation Prizes: G. Buchanan (Glasgow, N.W.); A. Large (Alloa); G. McTaggart (Dumbarton).

OVERSEAS

Price Codes Contest.—1. J. R. Hurst (Buenos Aires). 2. Heinz Dressler (Breslau, Germany). 3. G. B. Collie (Christchurch, N.Z.). 4. E. A. Bunt (Capetown, S.A.). Consolation Prizes: N. Bitek (Istanbul, Turkey); R. P. Plewman (Pretoria, S. Africa).

February Drawing Contest.—First Prizes: Section A, M. Conly (Dunedin, N.W.1); Section B, R. J. Dickison (Dunedin). Second Prizes: Section A, C. A. Astrom (Morko, Sweden); Section B, J. W. A. Ohiwerei (Ibadan, Nigeria). Consolation Prize: H. Toller (Ottawa, Canada).



BRAIN-WAVE

"Yes," the teacher explained, "quite a number of plants and flowers have the prefix 'dog.' For instance, the dog-rose and the dog-violet are well known. Can you name another?"

There was silence, then a bright boy put up his hand. "Please, miss," he called, "collie-flower."

* * * *

Hiker: "What do you often find at the end of a long tramp?"

Farmer: "His feet."

* * * *

Teacher: "Now, if I subtract 25 from 37, what's the difference?"

Willie: "That's what I say. Who cares?"

* * * *

A man went to a doctor and complained about seeing spots in front of his eyes. He was advised to get glasses.

Later he met the doctor, who asked if his eyes were improving.

"Yes," said the man. "The glasses are great. I can see the spots plainer now."

* * * *

A boy applied for a job. "Have you any ambition"? asked the manager.

"Ambition?" replied the boy, "I shall never rest until I am in that chair."

* * * *

Mother: "You didn't ask for a second piece of cake at the party, did you, Sonny?"

Jack: "No, Mummy; I just asked Mrs. Green for the recipe so that you could make some like it, and she gave me another piece without my asking for it."

* * * *

Jack: "Teacher said that I'm likely to go down in history."

Father: "That's fine, my boy."

Jack: "But he said I should do better in geography, arithmetic, and English."

* * * *

Schoolmaster: "When and where did William the Conqueror land in Britain?"

Dense pupil: "Don't know, sir."

Master: "What? Don't know when William the Conqueror landed? Hastings, 1066."

Pupil: "Oh, I thought that was his telephone number."

* * * *

"I lost half-a-crown this morning, George."

"That's bad luck. Hole in your pocket?"

"No—the man who dropped it heard it fall."

* * * *

"Tommy, what is a synonym?" the teacher asked.

"A synonym," said Tommy, "is a word you use when you can't spell the other one."

* * * *

Patient: "All that's troubling me now, doctor, is my breath."

Doctor: "Well, don't trouble about that. I'll give you something that will take it away."

* * * *

Keeper: "Hi! Keep away from that elephant!"

Small Boy: "Garn, I'm not 'urtin' him!"

* * * *

Tommy: "Gee, dad, there's a man at the circus who jumps up on a horse's back, slips underneath, catches hold of its tail, and finishes up on its neck."

Dad: "That's easy! Why, I did all that the first time I was on a horse."

* * * *

"Thank you for the presents, auntie."

"Oh, they are nothing to thank me for."

"That's what I thought, but mother told me to thank you all the same."

* * * *

A meek little man was in court for a minor offence.

"Were you ever in trouble before?" asked the Judge.

"Well, er-er," was the hesitating response, "I kept a library book too long once, and was fined threepence."

* * * *

"I've been trying to think of a word for two weeks."

"How about fortnight?"

HONEST

Farmer Brown: "Some dogs have more intelligence than their owners."

Willum: "You're right there, sir, I've got one of that sort myself."

* * * *

Diner: "I say, waiter, bring my hat."

Waiter: "It's on your head, sir."

Diner: "Don't bother, then—I'll look for it myself."



"A little over zealous, are we not, Ramsbotham?"

(By courtesy of "The Storyteller.")

(Block reproduced by courtesy of "The Railway Gazette.")

Freddie: "How many of these sweets do I get for a penny, please?"

Assistant: "Oh, six or seven."

Freddie: "I'll have seven, please."

* * * *

Master (looking up sternly from his desk): "Did I hear you laugh, Willie?"

Willie: "Please, sir, I was smiling when the smile burst."

* * * *

Judge: "I've lost my hat."

Lawyer: "That's nothing. I lost a suit here yesterday."

* * * *

Manager of football team: "I've found the very man we want. Eye like a hawk, body like a bullock, speed of a racehorse, kick like a mule."

Captain: "It's a forward we want, not a farmyard."

SALESMANSHIP

Urchin: "Have you got a match, please?"

Gentleman: "No, I haven't!"

Urchin: "Well, here you are, sir. Penny a box!"

* * * *

Landlady: "A professor formerly occupied this room, sir. He invented an explosive."

New Lodger: "Ah! I suppose those spots on the ceiling are the explosive."

Landlady: "No; they're the professor."

* * * *

She: "Are these field glasses high powered?"

He: " Rather! When you look at something less than ten miles away it looks as if it's behind you."

* * * *

Estate Agent: "There's not a flaw in the entire house."

Customer: "But what do you walk on?"

* * * *

"Why did you rob this man in broad daylight?"

"Well, you see, all my dates for night work were filled up!"

* * * *

The new recruit passed an officer without saluting.

"Here, my man," called the officer, "do you see this uniform I'm wearing?"

"Yes, sir; and just look at this thing they gave me."

* * * *

Teacher: "So you are the boy who wrote on the board, 'Teacher is a fool'?"

Tommy: "Yes."

Teacher: "Well, at least I am glad you have told me the truth."

* * * *

Teacher: "George, who defeated the Philistines?"

George: "I don't know, I only follow the first league teams."

* * * *

Plumber (at 'phone): "What's that? A leak in the water pipe? Well keep yer 'and over it. And just 'ang on a minute and I'll tell yer what day I can come."

* * * *

Taxi-driver: "Say, mister, the brakes won't take; I can't stop the car!"

Passenger (anxiously): "For goodness sake stop the meter, anyway."

* * * *

Tourist (in French restaurant): "I want some mushrooms."

Waiter: "Pardon. I not understand."

Taking a paper the tourist drew a sketch of a mushroom.

The waiter beamed with intelligence and rushed to execute the order. In a few minutes he returned with—an umbrella!

* * * *

Magistrate: "So you broke into a tobacconist's shop just to get a sixpenny cigar. Then what were you doing at the safe?"

Prisoner: "I was putting in the sixpence."

* * * *

An old lady who had been making a call from a telephone kiosk for the first time had given the operator a deal of trouble. At the end of the conversation she apologised profusely to the operator and added, "I have put sixpence in the slot for yourself."

* * * *

There was a young fellow named Lee,
Who fell from a very high tree:
His nose hit the ground
With a musical sound
And broke a large boulder in three.

* * * *

Passing through a village street a recruiting sergeant met a young farmhand delivering milk.

"Now, my lad, wouldn't you like to serve the King?" asked the recruiting sergeant.

"I would, mister," replied the other, "but I can only let him have a quart at night an' a pint in the morning."

Ocean Currents in Conflict

Everybody has heard of the Gulf Stream, the mighty ocean current that sweeps across the Atlantic Ocean and helps to make our climate more temperate than that of other lands at an equal distance from the North Pole. A curious feature of this current is that very little of it ever sees the Gulf of Mexico, where it is popularly supposed to begin. Its real starting point is much further south, for it is part of a gigantic whirlpool that carries warm water from the west of Africa to South America and then northward. The current from the Gulf then joins it, and the stream continues along the Atlantic coast of the United States, finally sweeping eastward to flow round the British Isles into the North Sea.

From time to time the Gulf Stream appears to get out of its course. For instance, in the winter of 1926-27 it spread far to the north, reaching the Atlantic coast of Canada and bringing with it milder weather than in normal years. This loitering in American waters was the reward of temporary success in its perpetual struggle with the Labrador current, a stream of cold water from Arctic seas that flows southward to meet it. When this is strong the Gulf Stream is weakened. At times the Labrador current is weak, however, and then the Gulf Stream presses it relentlessly and pushes triumphantly northward before turning aside on its usual course to Europe.

This battle with the Labrador current is not the Gulf Stream's only struggle, for it meets a new opponent when it reaches European waters. This also is a cool current, flowing down the Norwegian coast. If the Gulf Stream is strong, then its opponent is pressed against the coast of Norway, and the latter spreads out farther across the North Sea when the Gulf Stream is weak.

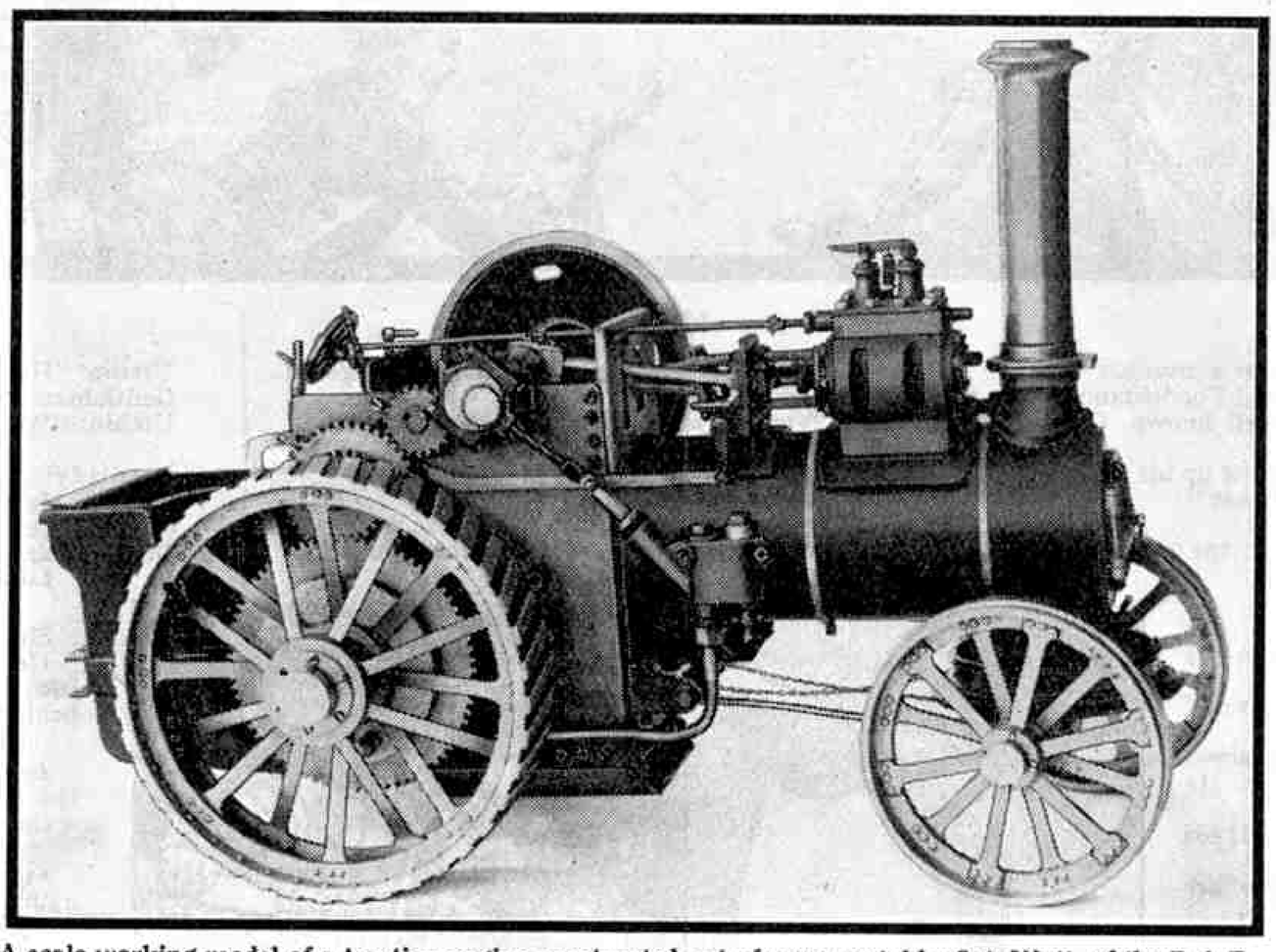
Much depends upon the issue of these conflicts. The Gulf Stream brings with it types of plants and animals that the food fish of the North Sea do not like. They prefer the cold Norwegian current, in which they thrive, and years of good catches on the fishing grounds there are those in which the Gulf Stream is weak and the cool Norwegian current penetrates far to the south and west. Thus fishing in the North Sea is good when the far distant Labrador current is strong.

Fish also are more abundant on the Grand Banks of Newfoundland when the Labrador current is strong. It seems curious that fish should thrive best in the cold waters of the Norwegian and Labrador currents, for generally speaking an agreeable warmth is more favourable to life. It seems likely that a temperature only a few degrees above freezing point is the best for the development of the tiny marine plants on which fish live.

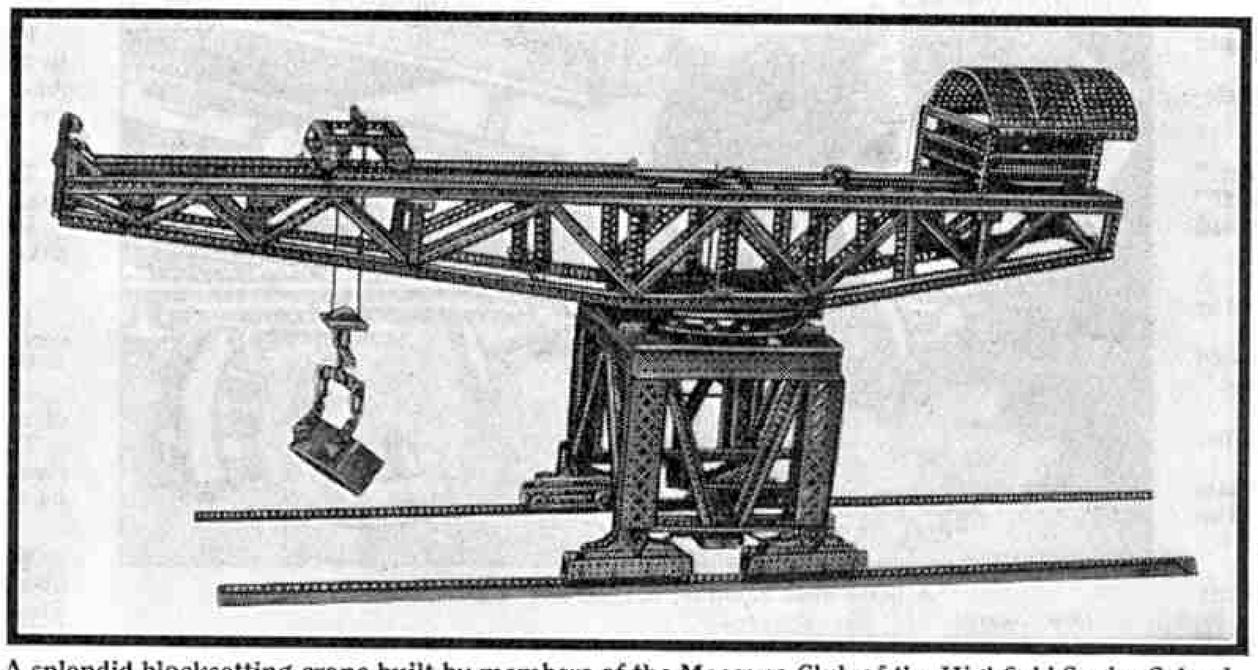
Model-Building in a Liverpool School

The senior boys of the Highfield School, Liverpool, are keen Meccano enthusiasts and under the guidance of Mr. Fearon, one of the masters, have formed a club for the purpose of building large working models. The models are specially chosen to show how engines and machines of all kinds work, and special attention is given to accuracy in design and precision in construction. No doubt many readers will remember a particularly interesting working model loom built by the club that was illustrated and described in the *"M.M."* for July.

The work of constructing a model usually is divided among groups of members, each group building one section, and all join under Mr. Fearon's immediate direction in the task of assembling the sections in order to complete the work. This form of model-building is particularly applicable to the Giant Block-setting Crane, and it is not surprising therefore to find that this has been built. Their model was a triumph of careful and thoughtful construction, and greatly impressed a member of our staff who inspected it. The crane moved slowly and majestically along on its track and gave a wonderful impression of power and efficiency as it carried out its various movements, and the members have had great fun with it.



A scale working model of a traction engine constructed out of scrap metal by Sgt. Watt, of the R.A.F. It is capable of hauling a man on a truck at a speed of 4 m.p.h.



A splendid blocksetting crane built by members of the Meccano Club of the Highfield Senior School, Liverpool. Interesting details of the model are given in an article on this page.

A Fine Working Model

The remarkable scale working model of a traction engine illustrated on this page was built of scrap metal by Sgt. Watt, of the Royal Air Force, who is stationed at Manston. It is interesting to note that its builder is a descendant of James Watt, the pioneer of the steam engine. The model was shown at a recent Arts and Crafts Exhibition at Manston, and was greatly admired.

Sgt. Watt spent three years in building the model, which is about 18 in. long and weighs three-quarters of a hundredweight. Coal is burned in its fire-box, exactly as in a real traction engine, and it is controlled and steered in the regular manner. It develops a surprising amount of power, and is capable of hauling a man on a truck at a speed of 4 m.p.h.

"Trouble Free" Photography

Zeiss Ikon Ltd. have issued an interesting booklet, with the title *"The Path to Trouble Free Photography,"* the object of which is to help beginners to obtain good results. It tells readers what to expect of a film, how to load the camera and to focus it and how to arrange their pictures. Exposure, developing and printing also are explained so clearly that failures will be rare for those who follow the advice given. Every reader who possesses a camera should write for a copy of this booklet, which can be obtained free from Zeiss Ikon Ltd., 46, Mortimer House, Mortimer St., London, W.1, on mentioning the *"M.M."*

The firm have sent us also copies of their booklet *"Contax Photography"* and their catalogue *"Zeiss Ikon Cameras."* Each of these deals with a most interesting range of first-class products and will be found of interest by all keen photographers, not only for the wide variety of equipment described but also for the practical notes embodied.

One item that is of general interest is a rifle butt equipment that was placed on the market last year for use with Contax cameras on long-distance work. In this the camera is fixed on a standard type of rifle butt and sighted on the object to be photographed in exactly the same way as a rifle is sighted on its target.

Both booklets are well illustrated and Zeiss Ikon Ltd. will be glad to send copies of them to any reader who is seriously interested.

Chemistry Experiments at Home

Messrs. A. N. Beck and Sons are offering prizes for short essays written by their customers explaining why they find amusement in chemistry experiments. The first prize is a chemistry cabinet, value £5/5/–, and there are 52 other prizes to be awarded.

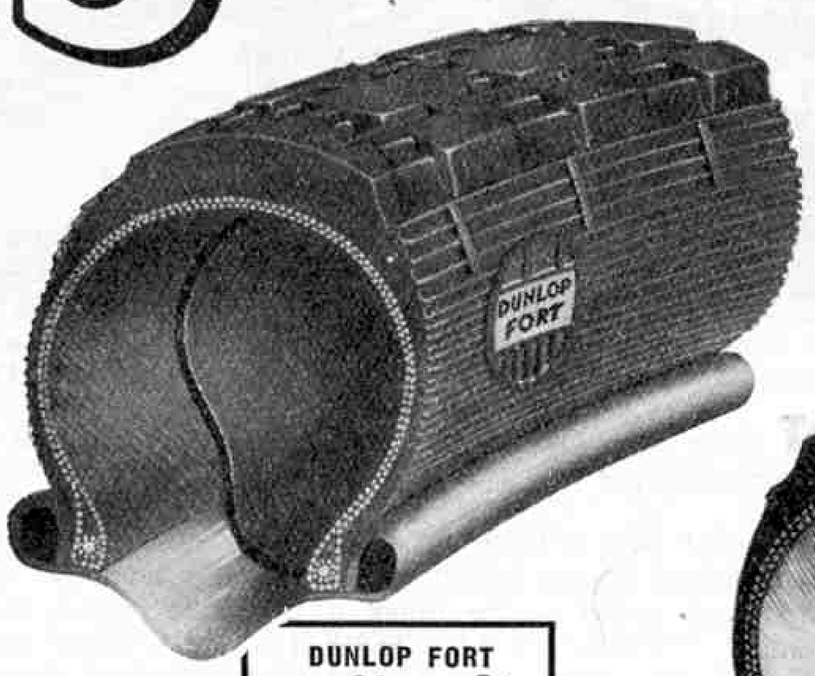
The competition is open until 31st August, and readers who are interested can obtain full particulars, including an entry form, from Messrs. A. N. Beck and Sons, 60, High Street, Stoke Newington, London, N.16.

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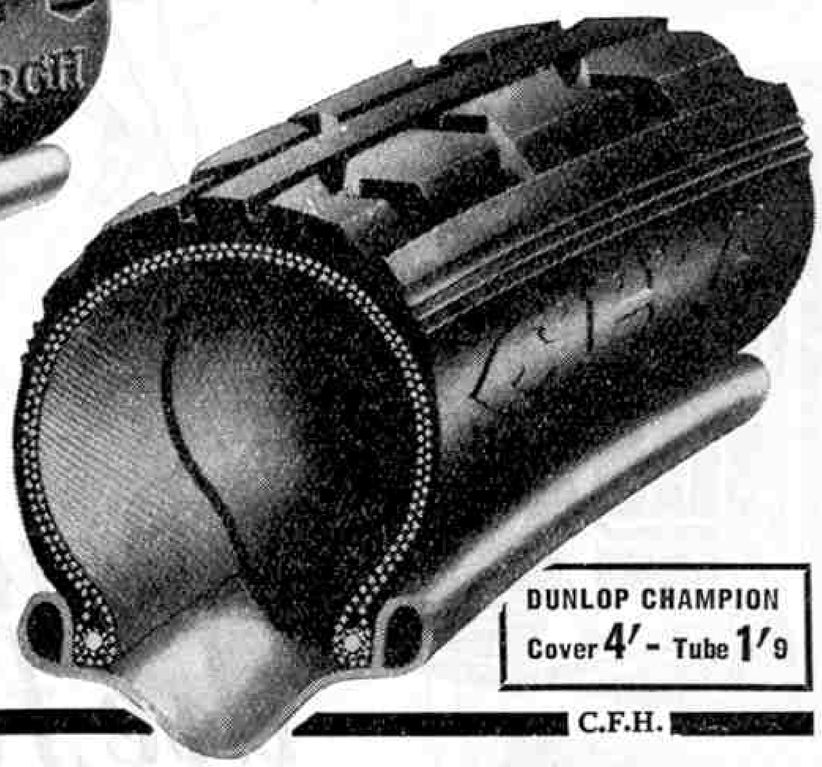
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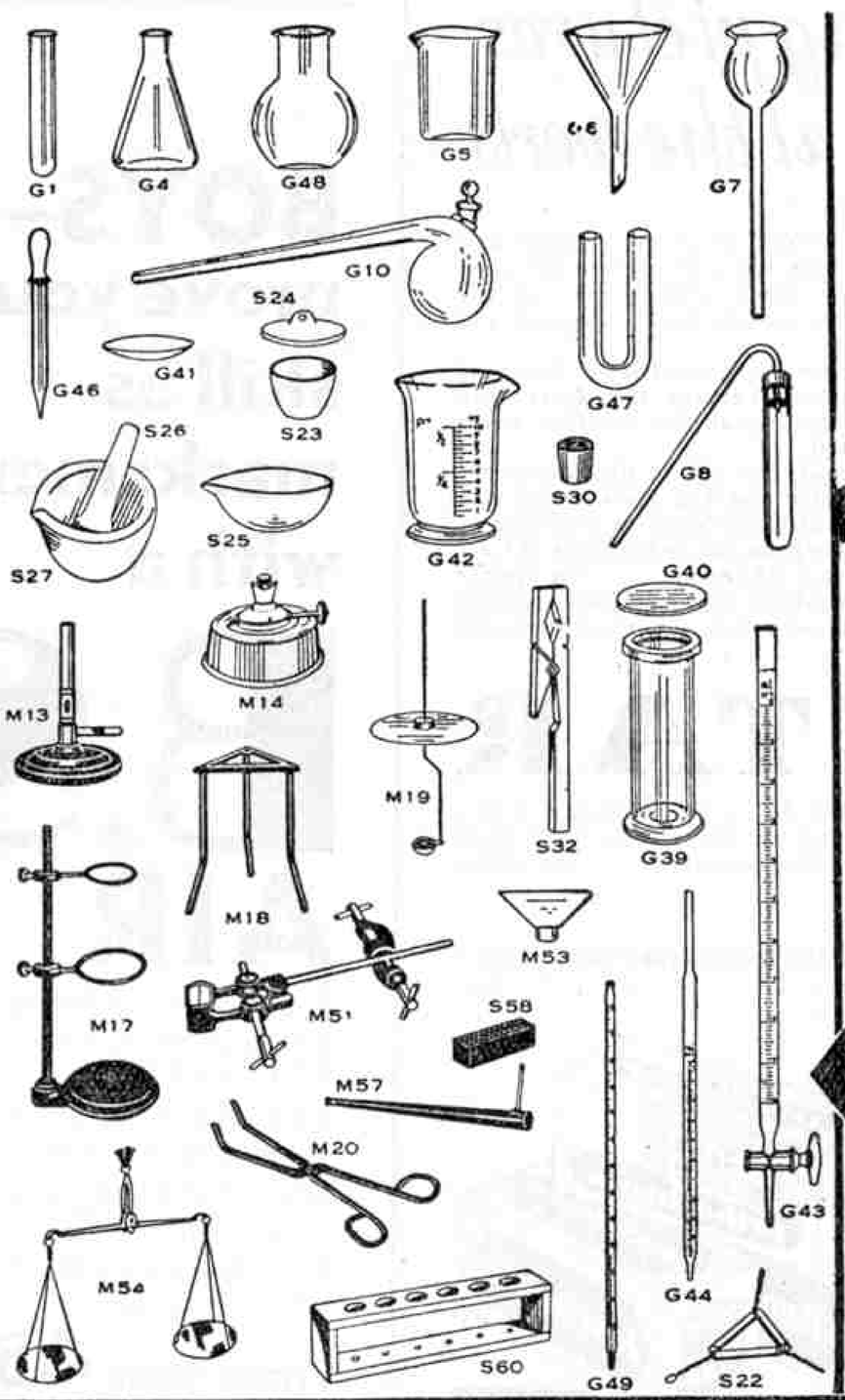
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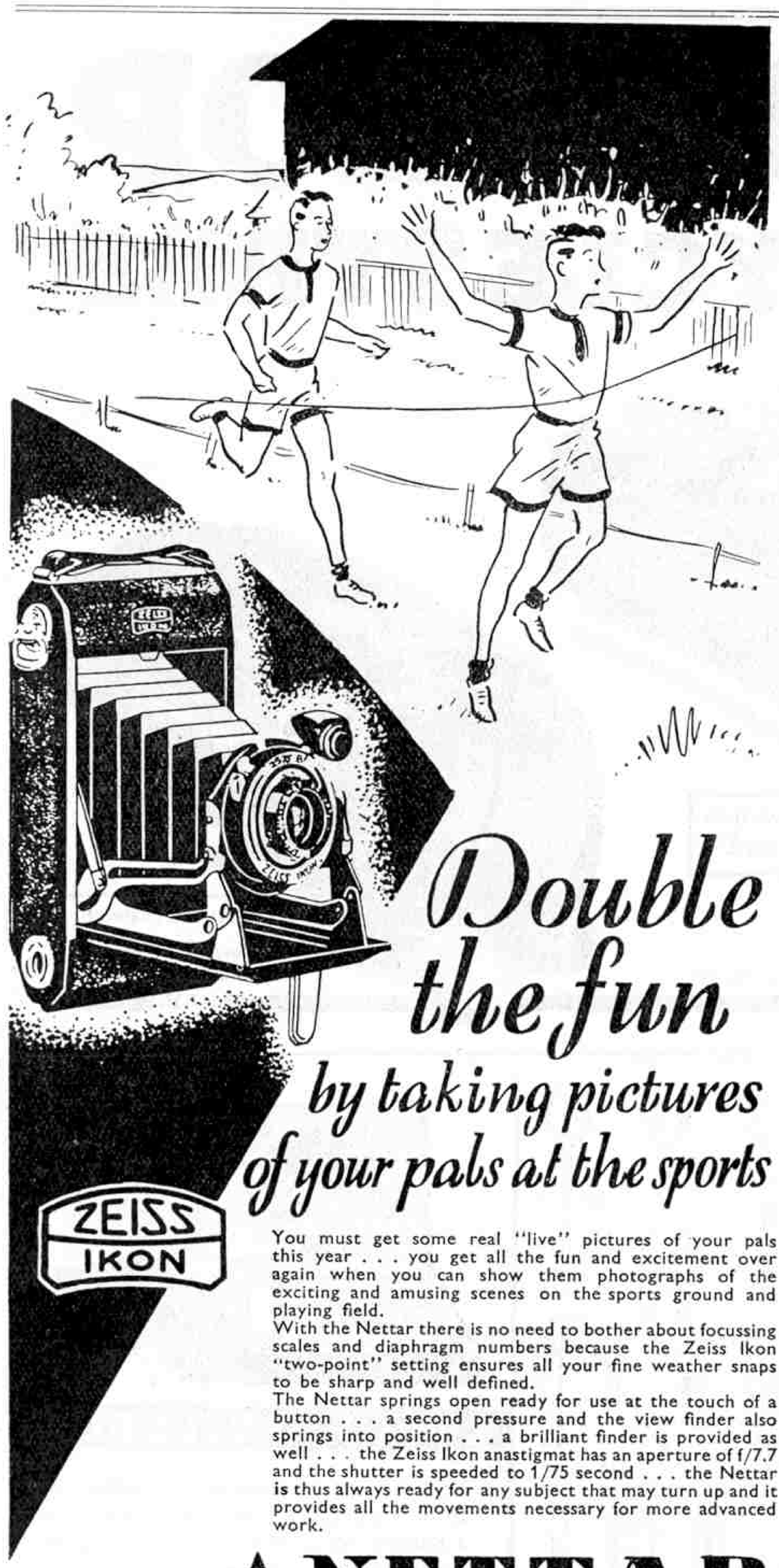
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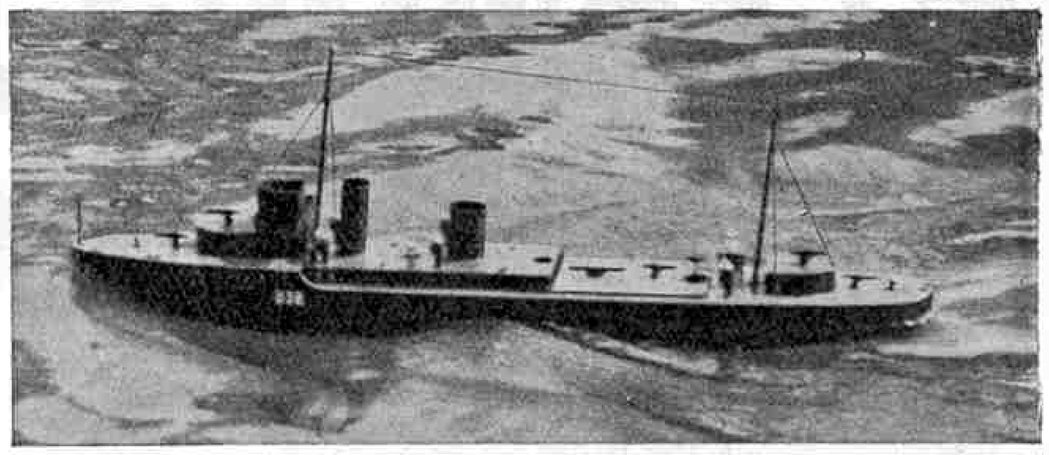
Write for a copy of **"The Path to Trouble-Free Photography."** *It is amusingly illustrated and will help you improve your pictures 100%.*

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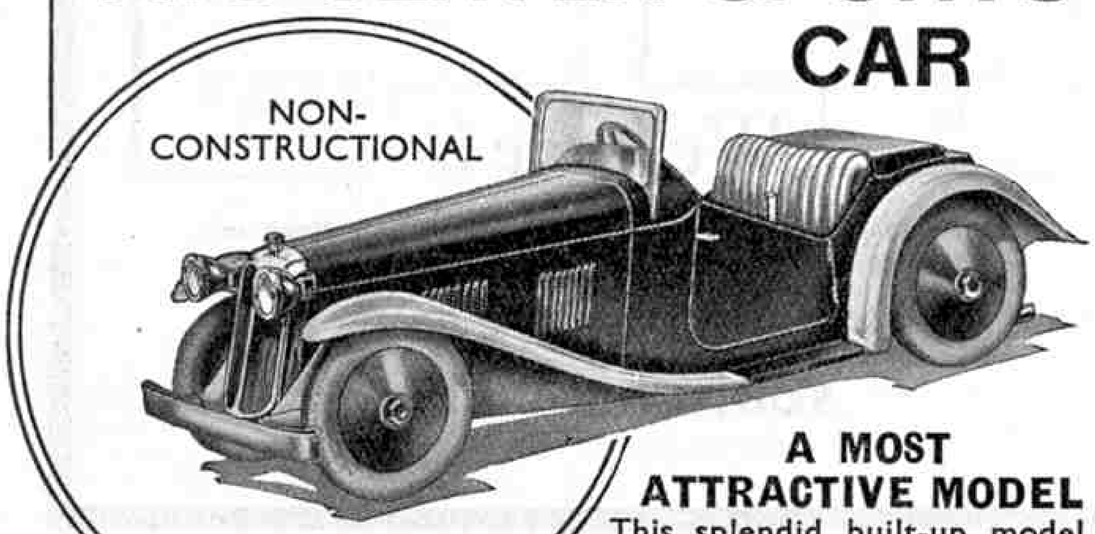


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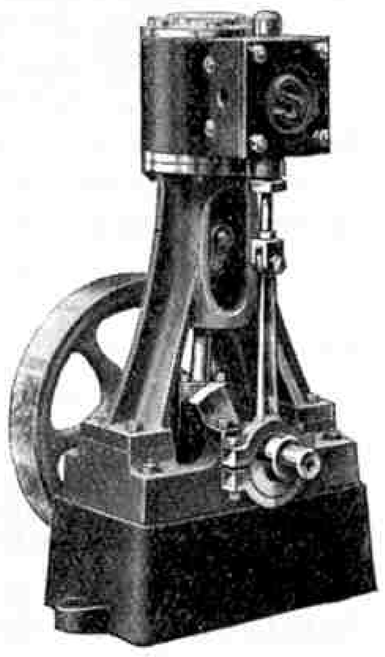
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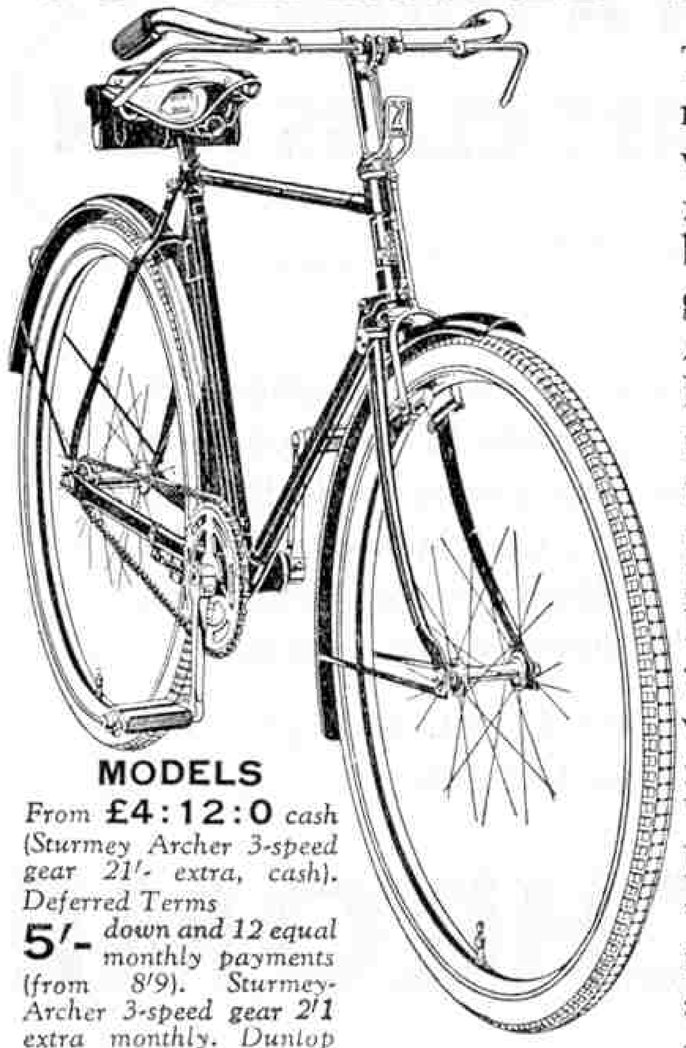
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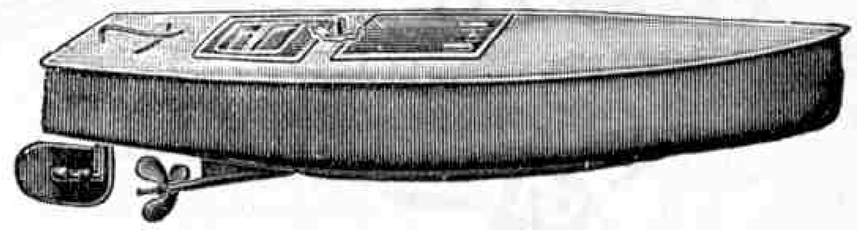
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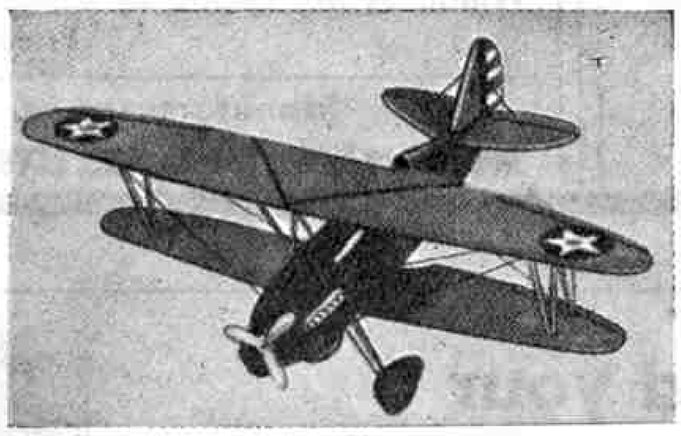
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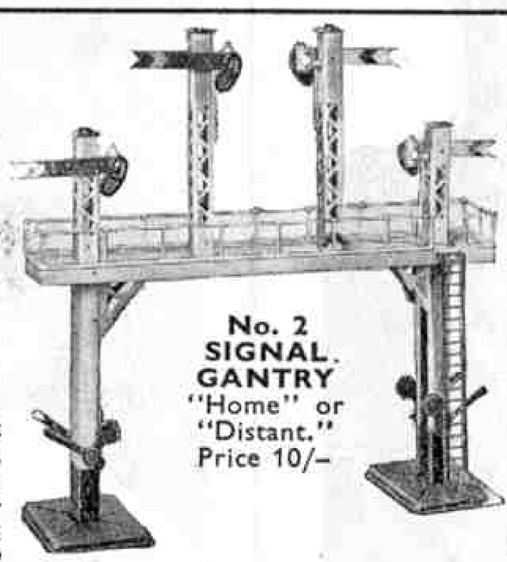
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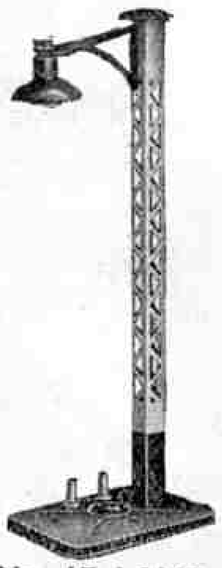
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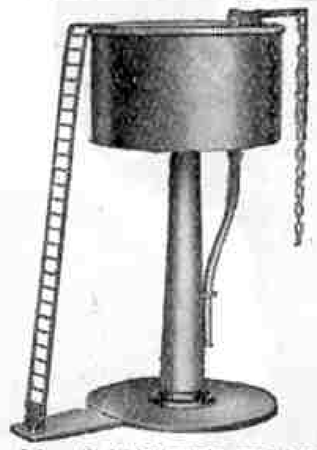
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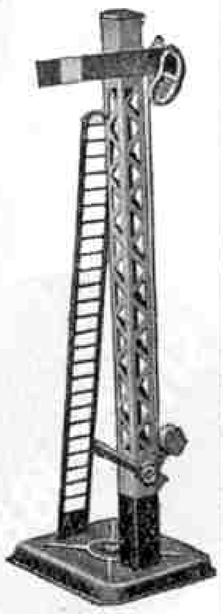
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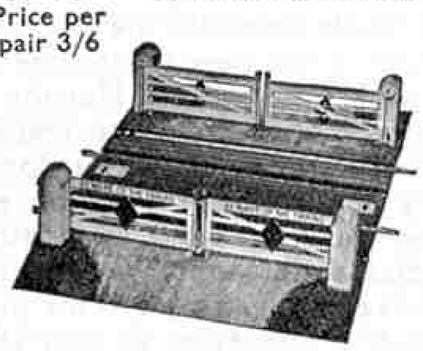
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No. 2 WATER TANK Fitted with flexible tube and valve lever. Stands 8½ in. high. Price 5/9

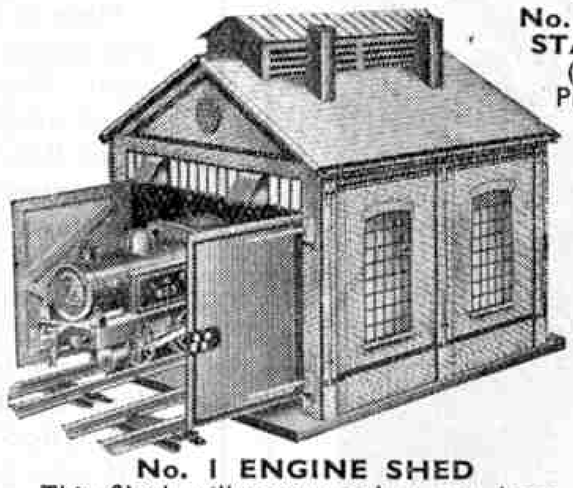


No. 2 SIGNAL "Home" or "Distant." Price 2/–

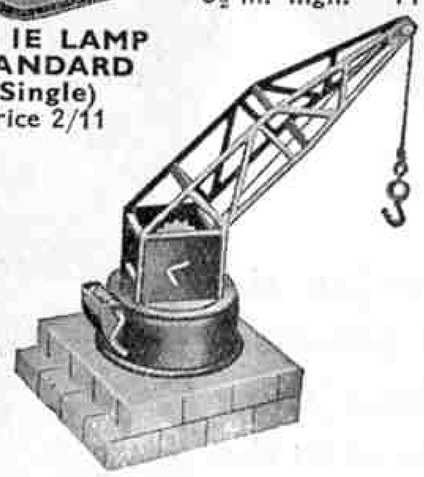


No. 2 LEVEL CROSSING Measures 13½ x 10½ in., with two tracks of gauge O rails in position, as illustrated. Price 5/6

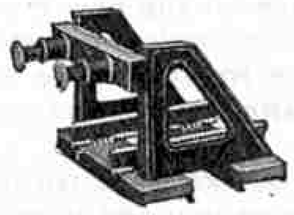
No. 1 LEVEL CROSSING Suitable for single track only. Price 2/11



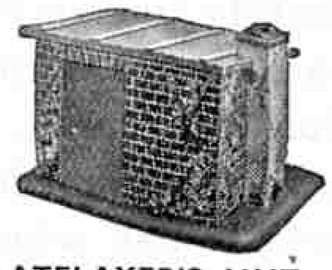
No. 1 ENGINE SHED This Shed will accommodate any Locomotive and Tender with an overall length not exceeding 8¾ in. Price 15/–



PLATFORM CRANE Fitted with a crank handle and ratchet mechanism. Price 3/11

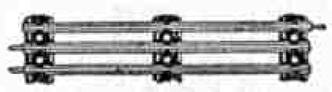


No. 1 BUFFER STOPS (Spring type). Price 1/–

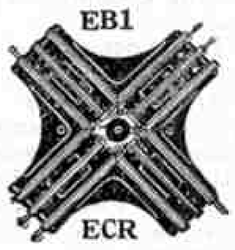


PLATELAYER'S HUT Price 1/–

HORNBY RAILS, POINTS and CROSSINGS



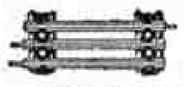
EB1



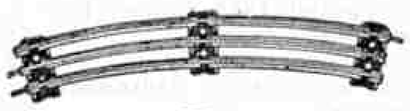
ECR



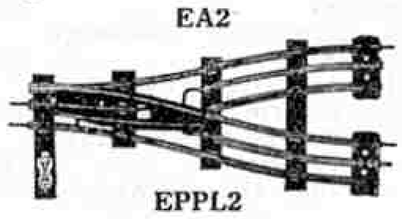
EA2½



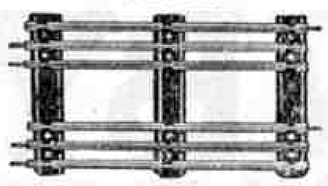
EB½



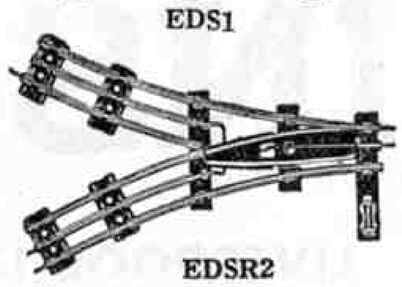
EA2



EPPL2



EDS1



EDSR2

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Hornby Rails, Points and Crossings are built for hard wear and for smooth running.

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A SELECTION OF RAILS, POINTS AND CROSSINGS FOR ELECTRIC TRAINS

EB1 Straight rails	per doz. 5/–
EB½ „ half rails ...	„ „ 4/6
EA2½ Curved quarter rails (2 ft. radius)	„ „ 4/–
EA2 Curved rails (2 ft. radius)	„ „ 5/–
EPPR2 Parallel points, right-hand	per pair 7/–
EPPL2 Parallel points, left-hand	
These points can be used with either 1 ft. or 2 ft. radius track.	
EPR2 Right-hand points (2 ft. radius)	per pair 7/6
EPL2 Left-hand points (2 ft. radius)	
EPR1 Right-hand points (1 ft. radius)	per pair 5/9
EPL1 Left-hand points (1 ft. radius)	
EDS1 Straight rails, double track	½ doz. 8/6
EDSR2 Double symmetrical points, right-hand (2 ft. radius)	per pair 7/–
EDSL2 Double symmetrical points, left-hand (2 ft. radius)	
EDSR1 Double symmetrical points, right-hand (1 ft. radius)	per pair 6/–
EDSL1 Double symmetrical points, left-hand (2 ft. radius)	

FOR CLOCKWORK TRAINS

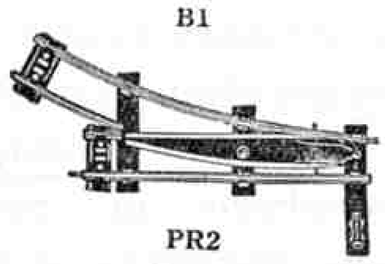
B1 Straight rails	per doz. 3/6
A1 Curved rails	„ „ 3/6
PR1 Right-hand points (1 ft. radius)	per pair 3/–
PL1 Left-hand points (1 ft. radius)	
PR2 Right-hand points (2 ft. radius)	per pair 3/–
PL2 Left-hand points (2 ft. radius)	
CA2 Acute-angle crossings (for 2 ft. radius track)	each 1/6
PPR2 Parallel points, right-hand	per pair 3/6
PPL2 Parallel points, left-hand	
The above can be used for either 1 ft. or 2 ft. radius track.	
DC2 Curved rails, double track, 2 ft. radius only ...	½ doz. 6/–

Ask your dealer for an illustrated price list.

MECCANO LIMITED, Binns Road, Liverpool 13

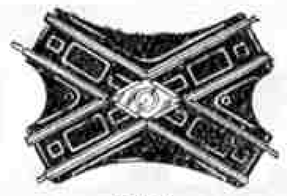


B1

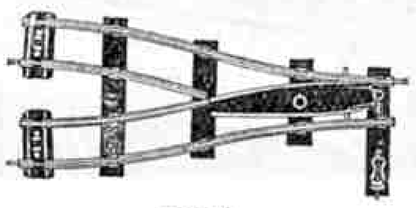


PR2

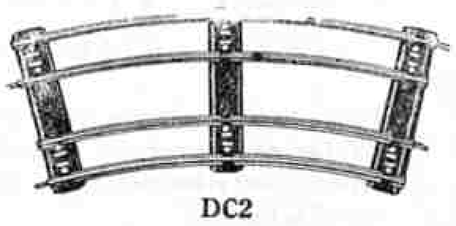
A2



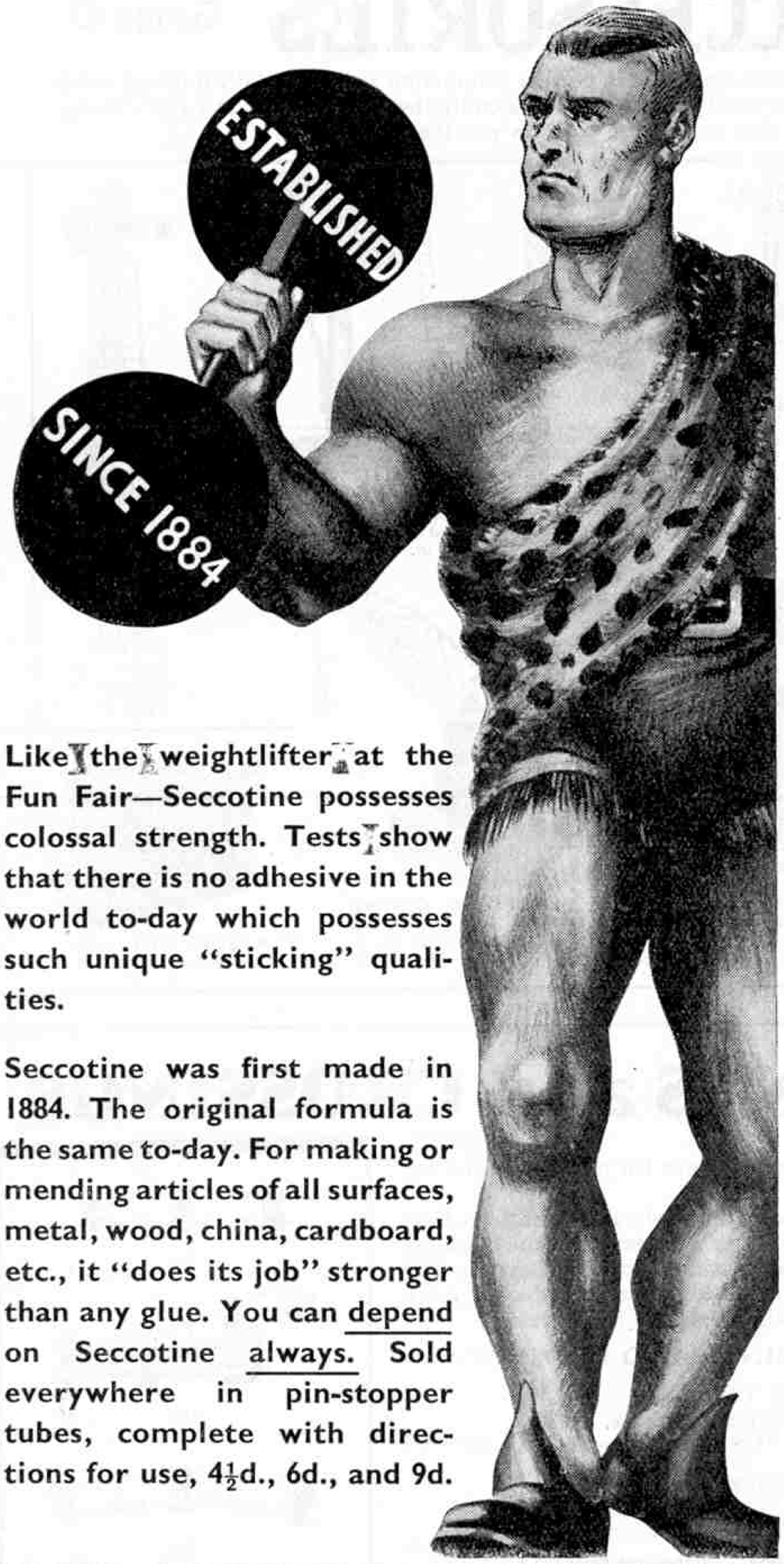
CA2



PPR2



DC2



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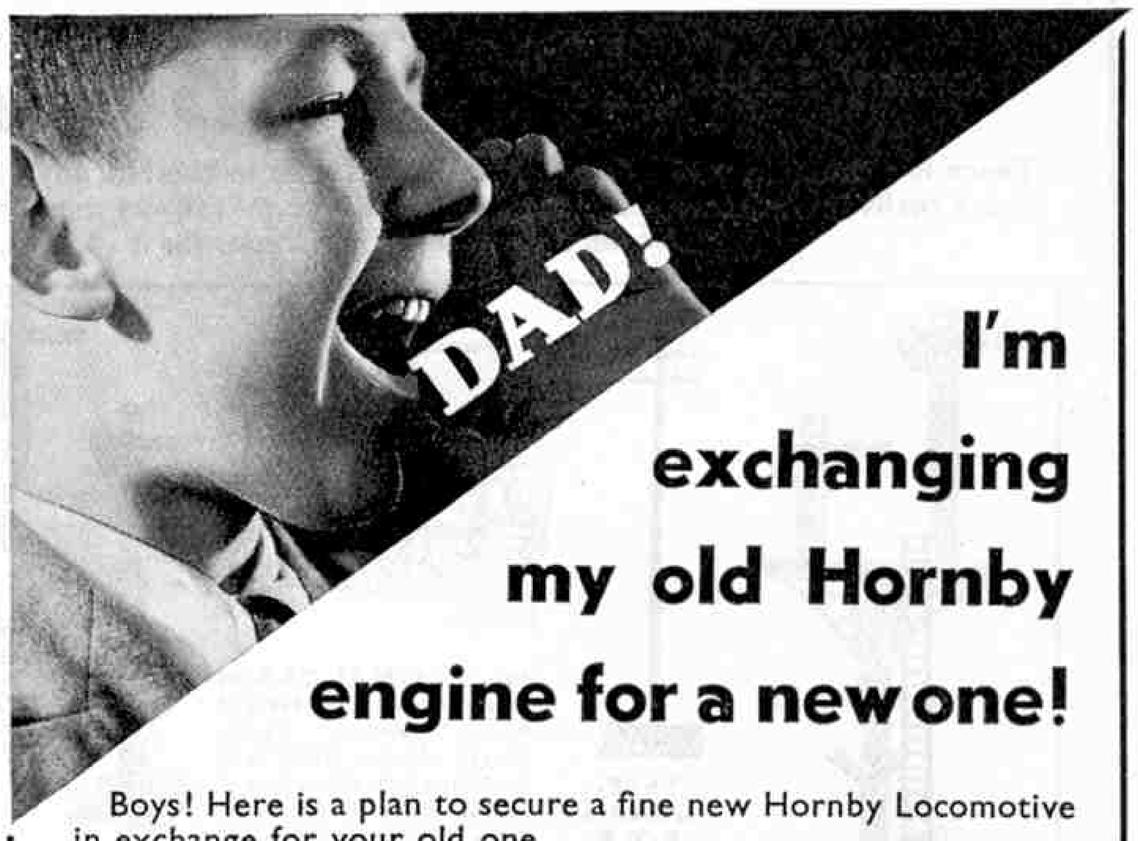
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If you prefer to do so, you can effect the exchange through your dealer, who will be very pleased to give you any information you require.

Part Exchange allowances for Hornby Locomotives

CLOCKWORK MODELS		ELECTRIC MODELS	
M2930 Locomotive	1/–	EM16 or EM120 Locomotive	4/3
MO Locomotive	1/4	No. 1 Electric Tank Locomotive, Permanent Magnet	7/6
M1/2 Locomotive	2/3	EM36 or EM320 Tank Locomotive	8/3
*George V Locomotive	3/3	LST M3/20 Tank Loco (20-volt)	8/3
*No. OO Locomotive	3/3	LE 120 Locomotive	10/–
M3 Tank Locomotive	3/9	LE1/20 Loco (Swiss Type) 20-volt	10/–
M3 Locomotive	4/3	E06 or E020 Locomotive	11/–
Zulu Locomotive	5/3	E16 or E120 Locomotive	12/–
No. O Locomotive	5/3	E16 or E120 Tank Locomotive	12/–
LEC 1 Locomotive (Swiss Type)	5/3	LST 1/20 Tank Locomotive (20-volt)	12/–
Zulu Tank Locomotive	6/3	LST 2/20 Tank Locomotive	12/6
No. 1 Tank Locomotive	6/3	E3/20 Locomotive	12/6
No. 1 Locomotive	6/3	E3/20 Riviera Locomotive	12/6
No. 1 Locomotive, fitted for Hornby Control	7/6	EPM16 Special Tank Locomotive	13/9
No. 1 Tank Locomotive, fitted for Hornby Control	7/6	Metropolitan L.V. Locomotive	15/–
No. 1 Special Locomotive	8/3	E26 Special Tank Locomotive	15/–
No. 1 Special Tank Locomotive	8/3	E36 Metropolitan Locomotive	15/–
No. 2 Locomotive	10/–	E120 Special Locomotive (automatic reverse)	15/–
No. 2 Tank Locomotive	10/6	No. 2 Electric Tank Locomotive	15/–
No. 2 Special Tank Locomotive	10/6	E120 Special Tank Locomotive (automatic reverse)	15/–
Metropolitan C Locomotive	10/6	E36 Locomotive	16/3
No. 2 Special Locomotive	11/3	E36 Riviera "Blue" Locomotive	16/3
No. 2 Locomotive, fitted for Hornby Control	11/3	E220 Special Tank Locomotive (automatic reverse)	16/3
No. 2 Tank Locomotive, fitted for Hornby Control	11/9	LE2/20 Locomotive	16/6
No. 3C Locomotive	12/–	LE220 Locomotive (automatic reverse)	16/6
No. 3C Riviera "Blue" Locomotive	12/–	E320 Locomotive (automatic reverse)	17/6
		E320 Riviera Locomotive (automatic reverse)	17/6
		E220 Special Locomotive (automatic reverse)	18/9
		Metropolitan H.V. Locomotive	18/9

**These models were identical.*

HORNBY TRAINS

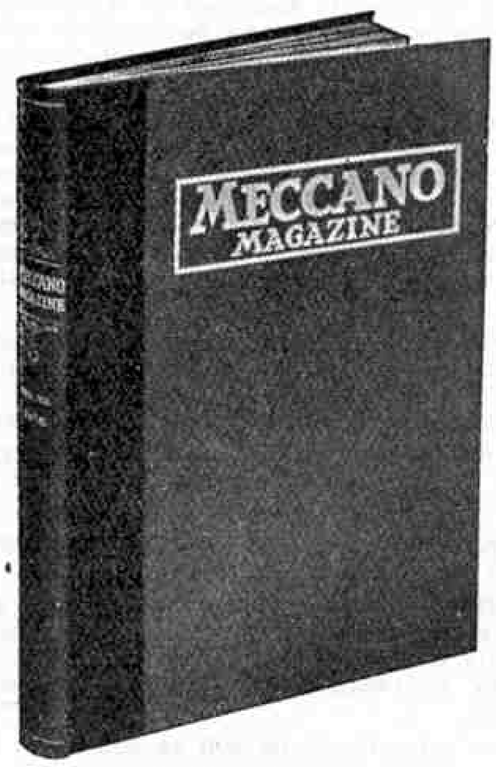
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There are two methods of binding the "*M.M.*" to preserve back copies from the mutilation that inevitably will be theirs should they be handled for any lengthy period without protection. First there is the spring-back binder system, that permits the copies to be inserted or removed from the binding case ot will. This is intended primarily as a temporary arrangement for the protection of copies during the currency of their volume.



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Permanent binding cases for back numbers of the Magazine can be supplied by Messrs. O. H. Bateman and Co., 23, Hanover Street, Liverpool. These cases are supplied in two sizes (1) for six copies, price 3/3 and (2) for twelve copies, price 4/9, post free in each case.

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These binding cases are supplied so that readers may have their Magazines bound locally, but where desired, the firm mentioned above will bind Meccano Magazines at a charge of 5/9 for six issues or 7/6 for twelve issues, including the cost of the binding and also return carriage. The covers of the Magazines may be included or omitted.

Whilst the binding of the twelve Magazines is quite satisfactory, they form a rather bulky volume and for that reason arrangements have been made to bind six months' Magazines where so desired, as explained above. Back numbers for any volume can be bound and the case will be embossed with the volume number.

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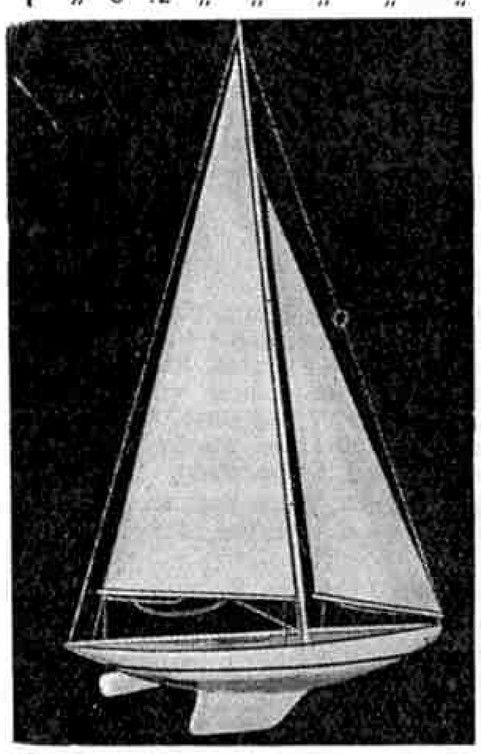
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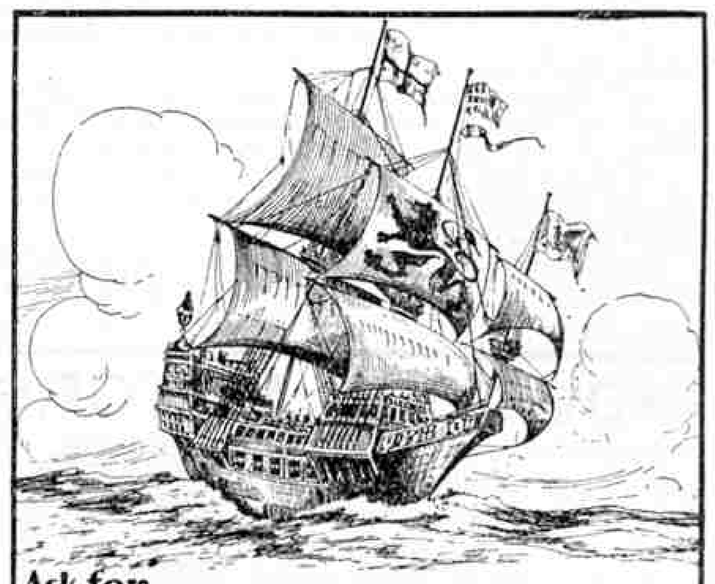
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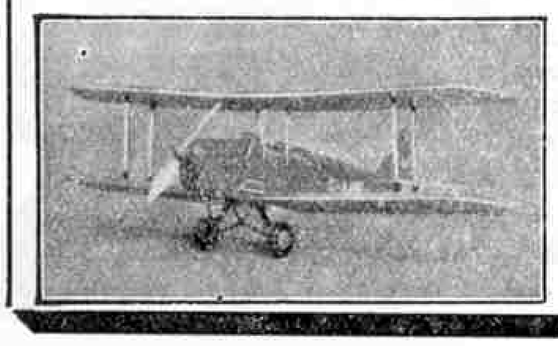
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Bargain. "M.M.'s," Jan. 1929 to date. Good condition, 17/6. 8/6 "K" Clockwork Launch, 2/6.—24, Church Avenue, S.W.14.

Bargain Sale! 30/- Standard Mains Cinematograph with Films and Slides, Bassett-Lowke Railway, Set 4 Red-Green Meccano, Jig-Saw Puzzles, Stone Anchor Building Blocks (large set in strong wooden box), Shocking Coil, Electric Motor, Speed Boat. All fine condition. Sold in bulk or separately. Stamp for list.—P. Flint, 30, Clarence Road, Chesterfield.

25/- Steam Engine, Truck, Brakevan, 36 ft. Track, all Bowman. Any offers.—G. Paxton, 41, Clarendon Road, Croydon.

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Bargains. Engine, Tender, Rails, etc. (Gauge O). Also Vertical Steam Engine, excellent for Meccano. 25/- the lot, or offers.—C. Hoy, "Kynton," Fyfield, Nr. Ongar, Essex.

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£10 worth Meccano Nickel Red-Green. £4 or offer. 45/- Adana and £3 worth type. £2 or offer.—Walker, Summerfield, Hebden Bridge, Yorks.

Sale. Model Sailing Yacht, length 42 in., cost about £5. Two Bing Locomotives, cost 13/6 each. What offers?—Lawrence, 17, Thane Villas, Holloway, London, N.7.

Perfect 'Britain's' Soldiers and Skybirds Aeroplanes and Accessories—For Sale—also Tent and Miniature Billiard Table, etc. List from—Wiseman, 85, Beehive Lane, Ilford, Essex.

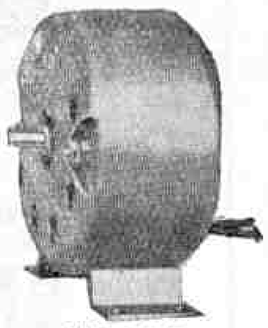
Sale. Adana Printing Outfit complete with type, ink, paper, etc. Model Railway, two Engines, Lines, Rolling Stock.—H. Roebuck, Oldhay, Totley, Sheffield.

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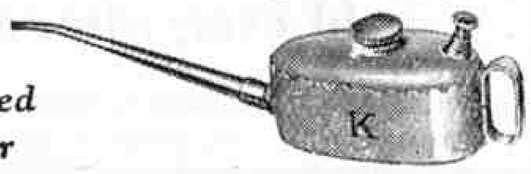
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Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/- for six issues and 8/- for twelve issues.

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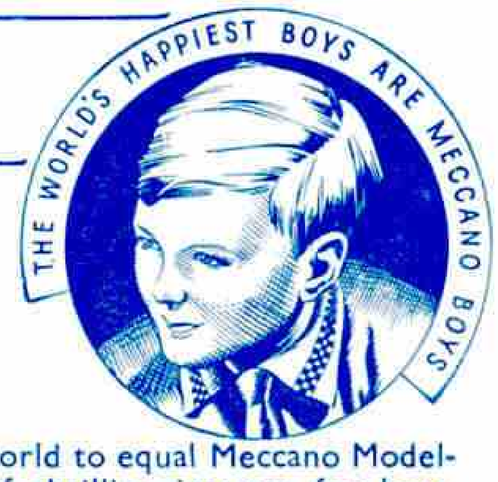
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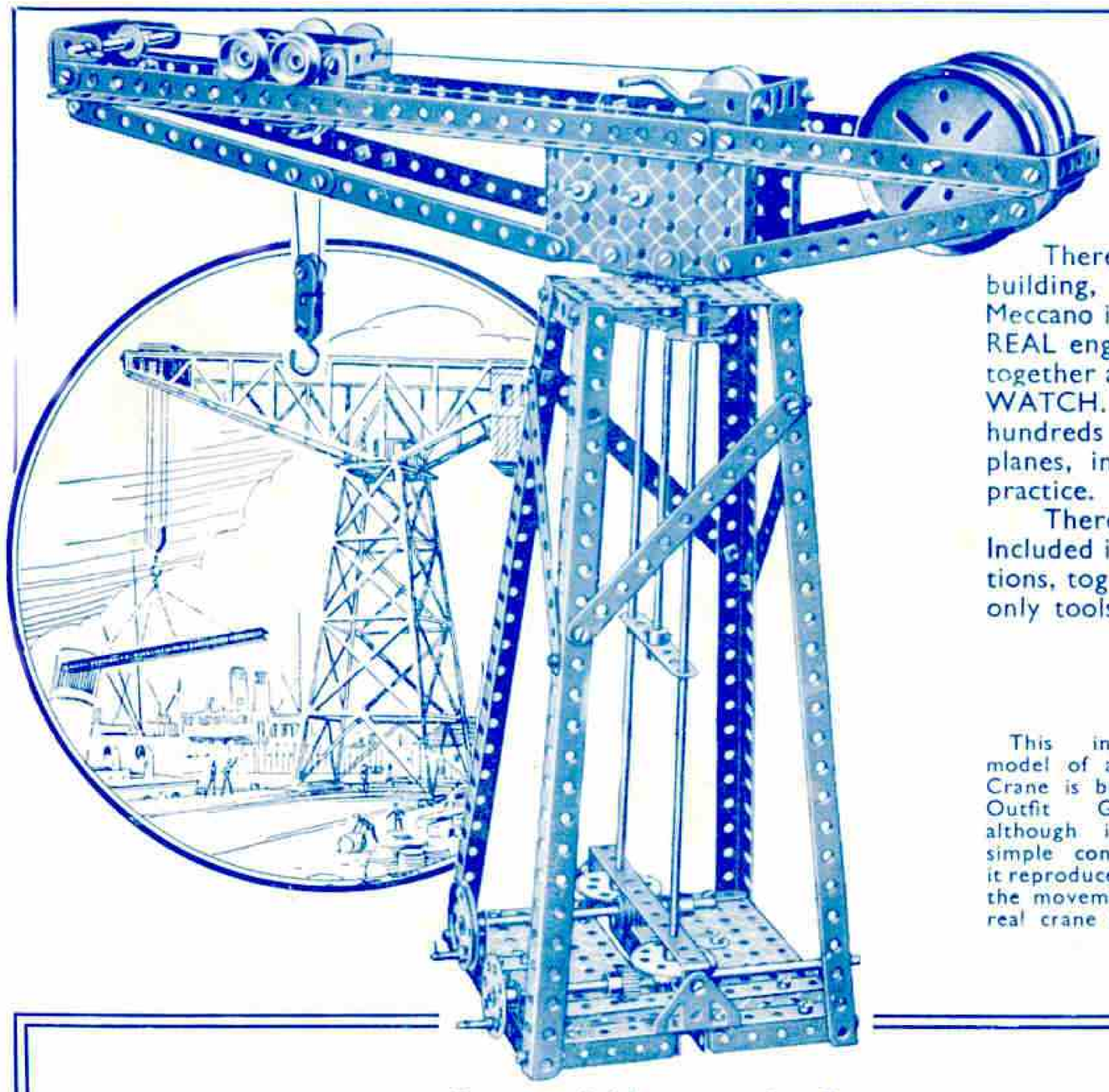


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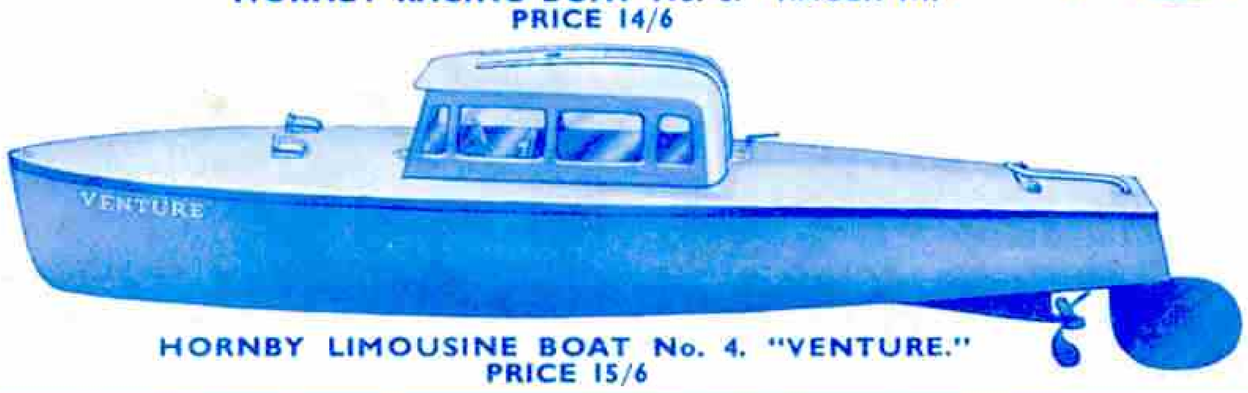
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